

2007

Visual design in the online learning environment

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Visual design in the online learning environment

by

Mandi Jo Pralle

A thesis submitted to the graduate faculty
in partial fulfillment of the requirements for the degree of
MASTER OF FINE ARTS

Major: Graphic Design

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Ames, Iowa

2007

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ABSTRACT

Today more and more students take online courses because they offer flexibility and convenience the traditional classroom does not. The development of online courses first began in haste, but educators have since regrouped from the initial absence of strategic planning. However, the *visual* design of online courses continues to be ignored in online courses seeing that most online course developers do not have a background in design. This study establishes the importance of using principles of good design in online courses while at the same time creates a design guide for online course developers. The research conducted in visual design is applied to designing a new prototype for an online course. Surveys were used to gain knowledge about the visual design of online courses, and to make a comparison between the original course and the prototype in the following design areas: typography, color, image, and visual organization/layout. The results indicate that the principals of good design do improve the learning environment for students. Creating a well-designed course is important because it will eliminate confusion and frustration, and instead provide a more efficient, effective, visually engaging site that will hold learner's attention more successfully.

CHAPTER 1: INTRODUCTION

1.1 PROBLEM STATEMENT

Since the creation of online courses, visual design has generally been ignored. Tony Brock, assistant professor of graphic design at North Carolina State University states, "...most online course developers don't exploit the world of visual design to its fullest."¹ Visual design is typically not taken into account because as Brock says, "People look at it as window-dressing instead of as an important way to make information more understandable, to get the main content across."² Most online course developers do not have a background in design and many instructors are responsible for the design of their own course. To ensure a quality course, instructors spend a bulk of their time on content—not on the presentation of the content.³

It states on the ArtIS 301 Foundations of Visual Literacy course site (the course that will be redesigned), "As in any online course, it tends to be a little confusing to find information on how the site actually works."⁴ This study hopes to demonstrate that a well-designed course can eliminate confusion, and can instead aid in understanding.

¹ Judy Dahl, "Visual design: It's more than just window-dressing," *Distance Education Report* 9.10 (2005): 1.

² Ibid, 1.

³ Mary Lou Santovec, "Strategies to ensure quality," *Distance Education Report* 8.22 (2004): 1.

⁴ "Using this site" <http://www.vis.design.iastate.edu/coursefiles/about201.html> (accessed September 30, 2006)

1.2 PURPOSE OF STUDY

The purpose of this study is two-fold: (1) to establish the importance of using the principles of good design in developing an online course (2) to create a design guide for online course developers.

E-learning has been termed explosive, disruptive, unprecedented, and a revolution in higher education.⁵ There is a huge potential in e-learning, however many educational institutions do not recognize it. Although the revolution has begun, "...the revolution proceeds without any clear vision or master plan."⁶ Good visual design is one area that can improve the "vision" of online learning, and help in reaching its potential.

1.3 SIGNIFICANCE OF STUDY

The significance of this study is to make evident that good design can improve the learning environment for the online student. This study will also encourage educators and course developers to give more consideration to the visual design of an online course. Ideally, a person with a background in design would assist in the development of an online course. But when that is not practical, this study will also provide design guidelines for course developers without any design experience.

⁵ D.R. Garrison and Terry Anderson, *E-Learning in the 21st Century: A framework for research and practice*, (London: RoutledgeFalmer, 2003), p. xi.

⁶ Ibid, xi.

1.4 LIMITATIONS OF STUDY

It would require a great deal of time to redesign an entire online course and test it on a class for a semester. In this study, one unit of the main course was selected to redesign to compare to the data from the existing course design.

Majority of the survey participants were females in the age range of 18-25, living in Iowa. Only a small sample of students were surveyed in all three surveys, and most of the students who participated in the first survey had taken their online courses using a course management system (e.g. WebCT). The use of a CMS such as WebCT limits the design choices for the course developer.

CHAPTER 2: DISTANCE EDUCATION

2.1 DEFINITION OF TERMS

In a report prepared for the State Council of Higher Education for Virginia, New Dominion Partners, distance education is defined as “any formal approach to learning that takes instruction to the learner rather than taking the learner to instruction.”⁷ In their 2000 Master Plan for Higher Education, the Washington State Higher Education Coordinating Board’s definition of distance education states, “Distance learning takes place when teachers and students are separated by physical distance for most of the instructional delivery.”⁸ Other definitions of distance education include communicating through technology and taking place in different locations at the same time. The term distance education can be interchanged with distance learning, distributed education, distributed learning, and virtual learning interchange.⁹

E-Learning is a form of distance education that can be defined as “...the delivery of educational content via any electronic media, including the Internet, intranets, extranets, satellite broadcast, audio/video tape, interactive TV, CD-Rom, interactive, CDS, and computer-based training.”¹⁰ E-learning is defined by the New Zealand Ministry of Education as “learning that is enabled or supported by the use of digital tools and content.”¹¹ This study will focus on students learning in the online environment.

⁷ Marjorie Fusco and Susan E. Ketcham, *Distance Learning for Higher Education*, (Greenwood Village, CO.: Libraries Unlimited, 2002), 2.

⁸ Ibid, 4.

⁹ Ibid, 3.

¹⁰ William Tastle, Bruce A. White, and Peter Shackleton, E-Learning in Higher Education: The challenge, effort, and return on investment, *International Journal on E-Learning* 1.2 (2005), 242.

¹¹ Mark Nichols and Bill Anderson, Strategic E-Learning Implementation, *Educational Technology & Society* 8.4 (2005), 1.

Asynchronous and synchronous are terms used to describe modes of communication used in E-learning. Asynchronous communication takes place between two participants at different times. When students communicate synchronously, they interact simultaneously in 'real-time.'

2.2 GROWTH OF E-LEARNING

E-learning continues to grow for several reasons. Today 20% of all higher education students now take online courses—a dramatic increase from just under 1% in 1995.¹² Students today want flexibility and convenience. More and more students need to work while attending school. When coupled with the demand for lifelong learning, it creates a need for flexible scheduling.¹³ This demand has put student-scheduling needs before university convenience. The demand for E-learning has presented a challenge for the inflexibility and inconvenience of the traditional university structure.

In 2005, the first comprehensive survey of consumer attitudes was revealed at the “Competing in Higher Education” conference. “According to the report, 77% of prospective college students in the United States would consider enrolling in an online distance education program.”¹⁴ Students both want and need the flexibility and convenience of an online course.

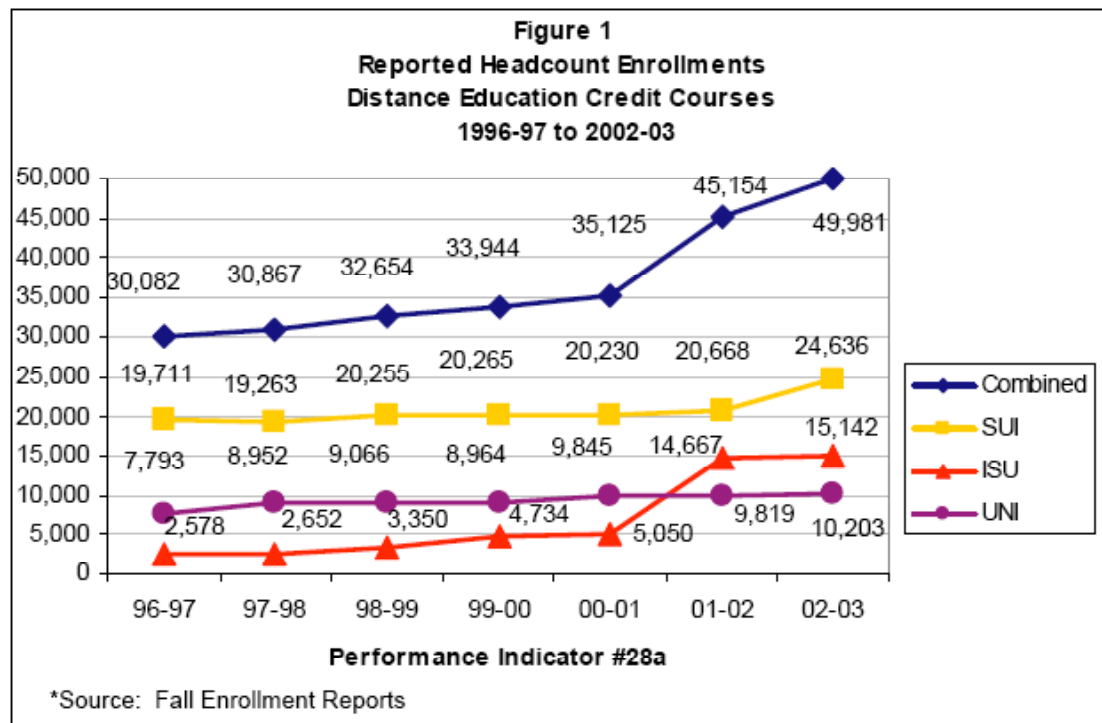
¹² Mary Beth Lakin, “Gauging Investments: E-Learning in U.S. education,” (American Council on Education, 2006), <http://www.acenet.edu> (accessed June 8, 2006)

¹³ Jennifer Patterson Lorenzetti, “How eLearning is Changing Education: A new look,” *Distance Education Report* 9.15 (2005), 4.

¹⁴ “Study Finds Over 75 percent of American Students Interested in Online Courses: Quality still a concern,” *Distance Education Report* 9.13 (2005), 3.

Each year the Board of Regents creates a report that analyses the current state of distance education in the three Regent Universities (Iowa State University, University of Iowa, and University of Northern Iowa). In that report is a strategic plan on how the Board plans to move forward, based on the data collected throughout the year. According to the Board of Regents 2005 report, “Each Regent University has a system of on-going data collection regarding distance education needs and of using the results to inform decisions about off-campus programmatic offerings.”¹⁵ Each university looks at student and employer market demand, assessments of educational needs, assessments of economic/workforce development requirements, and academic and institutional needs. In the graph below (Fig. 1 taken from the Board of Regents 2002-2003 report), it shows the total headcount enrollment in distance education credit courses has risen significantly, from 30,082 in 1996-97 to 45,154 in 2001-02.

¹⁵ Board of Regents, Annual Report on Distance Education 2005, Iowa: Board of Regents.
<http://www2.state.ia.us/regents/index.html>

Figure 1. Headcount Enrollments in Distance Education Credit Courses

Source: (Board of Regents Annual Report on Distance Education, 2002-2003)

According to the 2002-2003 Board of Regents Annual Report on Distance Education, Iowa State has an edge over both the University of Iowa and the University of Northern Iowa in Web courses and Web technology.¹⁶

Web-based courses

Iowa State – 158

Iowa – 113

UNI – 81

Students enrolled in Web-based courses

Iowa State – 2,318

Iowa – 280

UNI – 1,109

¹⁶ Board of Regents, Annual Report on Distance Education 2002-3003, Iowa: Board of Regents.
<http://www2.state.ia.us/regents/index.html>

Number of faculty using Web based technology in coursework

Iowa State – 1,300

Iowa – 113

UNI – 62

Number of faculty trained to use Web based technology

Iowa State – 858

Iowa – 113

UNI – 62

Web based certificate programs

Iowa State – 8

Iowa – 1

UNI – 2

All of the recent reports put out by the Board of Regents continue to include the growing competition for distance education students. “Regent universities report that more and more students are supplementing their on-campus experience with coursework obtained through distance means, often from other institutions.”¹⁷ Recent reports have noted that this may have implications for on-campus enrollments. In 2005, enrollment dropped to 25,741 at Iowa State from 26,380 in 2004 and 27,380 in 2003. All Regent universities experienced a drop in enrollment in 2005. Traditional universities now have to compete with distance education providers that use aggressive marketing and pricing to attract students.

¹⁷ Board of Regents, Annual Report on Distance Education, Iowa: Board of Regents.
<http://www2.state.ia.us/regents/index.html>

The elimination of the 50% rule in the Higher Education Act will continue to bring more competition for the traditional university and increase the growth of E-learning. The 50% rule prevented colleges and universities with enrollments of 50% or more in distance education from participating in federal student aid programs.¹⁸ Since Congress eliminated this rule, “colleges are likely to ramp up their online offerings and investors could spend big money creating new for-profit online programs.”¹⁹

Many other factors contribute to the growth of E-learning. These factors include new computer and Internet technologies, the emergence of for-profit education institutions, and the decrease in the percentage of the “traditional” college-aged student seeking higher education.²⁰

2.3 ADVANTAGES OF E-LEARNING

E-learning has continued to grow because of the many advantages it can offer over the traditional classroom. Author of the article “Distance Learning and Teaching in the Twenty-First Century,” Raymond Pirouz states, “For the very first time in the history of teaching, the Internet is allowing instructors and their students to gather, share ideas, engage in deep discussions, and learn from one another’s discoveries and observations without having to brush teeth, wear a stitch of clothing, or commute in ungodly traffic conditions.”²¹

¹⁸ Lakin, “Gauging Investments.”

¹⁹ Lakin, “Gauging Investments.”

²⁰ Chandra M. Mehrotra, C. David Hollister and Lawrence McGahey, *Distance Learning: Principles for effective design, delivery, and evaluation*, (Thousand Oaks, CA.: Sage Publications, Inc., 2001), 223.

²¹ Steven Heller, *Education of an E-Designer*, (New York: Allsworth Press, 2001), 24.

Students can post assignments, as well as view and respond to assignments posted by other students. The interaction of students is a huge advantage of online learning. Students and instructors can create new discussions or maintain ongoing discussions. The traditional class rarely allows time to revisit past discussions. Online classes promote the continuation of discussions, “offspring” and sideline discussions.²² These discussions can enhance learning. Students learn from the instructor as well as other students. “Interaction prompts more interaction, stimulates ideas, reactions, challenges, and even differences.”²³

The online classroom brings together educators and learners together to share information and exchange ideas. A virtual classroom provides the student a “safe haven” for learning to take place.²⁴ An online course usually allows students to more freely express themselves. For example, quiet students in the traditional classroom can find their voice in an online class.

A good online instructor will maximize the benefits of the online course. The online course should “...Provide students with a variety of activities, tools, and communication forums to keep the online environment engaging and interesting.”²⁵ E-learning should also encourage the use of a variety of different learning styles. “It [eLearning] provides a potential plethora of multiple media and hence mulitsensory approaches to learning.”²⁶

²² Ibid, 24.

²³ Mercedes Fisher, *Designing Courses & Teaching On the Web: A “how-to” guide to proven innovative strategies*, (Maryland: ScarecrowEducation, 2003), 8.

²⁴ Fusco, *Distance Learning for Higher Education*, 8.

²⁵ Karen L. Milheim, “Strategies for Designing On-Line Courseware,” *International Journal of Instructional Media* 31.3 (2004), 1.

²⁶ Lorenzetti, “*How eLearning is Changing Education*,” 7.

Students also enjoy the flexibility, convenience, and personal autonomy that online learning gives them. In most online courses, a student can learn at their own pace.

2.4 DISADVANTAGES OF E-LEARNING

While e-learning has many advantages, it also has disadvantages. An online class requires the student to have more motivation and self-discipline than the traditional classroom demands. “Some students quickly find themselves struggling to stay above the surface in a body of water in which they thought they would be able to stand.”²⁷

While retention has always been a problem in online courses, educators continue to work to ensure higher completion rates. Drop out rates are lowest at the most selective schools and highest at the least selective.²⁸

E-learning increases the student’s dependency on technology and people who are proficient with technology. Students can blame the technology for not doing the coursework. The instructor could hear excuses similar to “the server is down,” “my hard-drive crashed,” or “I could not connect.”²⁹ Students must also have a basic understanding of the technology involved in e-learning.

Another disadvantage to distance education is the costly expenditures on technology and human resources. E-learning requires extra staffing such as site facilitators, technical support staff, and faculty trainers.³⁰

²⁷ Gene Maeroff, *A Classroom of One*, (New York: Palgrave MacMillan, 2003), 88.

²⁸ Mehrotra, *Distance Learning*, 139.

²⁹ Fisher, *Designing Courses & Teaching On the Web*, 168.

³⁰ Maeroff, *A Classroom of One*, 11.

Many studies have been done to compare the preparation time of an online class to a traditional course. According to one study it takes up to 66 to 500 percent longer to create an online course than to prepare a course to teach in person.³¹ However, the developer only has to maintain the course after it is created. A large part of the preparation time comes from the initial creation of the online course.

Some educators still do not accept online learning. Since the rapid growth of e-learning, teachers worry about the security of their profession. “Those who are most alarmed characterize e-learning as inhuman and inhumane, a mechanistic, robotic approach to education that cannot possibly be the equal of a teacher in a classroom with a group of students.”³²

Proponents of e-learning need to strive to maximize the advantages and minimize the challenges to fully utilize the potential of online learning.

2.5 POTENTIAL

While e-learning has grown tremendously over the years, it has still to utilize its full potential. Many researchers wanted to find out if there was a “significant difference” in the learning outcomes of distance education and those of the traditional classroom. A great body of research “touts that there are no significant differences between the learning outcomes of distance education and those of classroom based education.”³³ That *seems* like great news for online learning. In her book *Distance Education: The*

³¹ Ibid, 34.

³² Ibid, 88

³³ Judith L. Johnson, *Distance Education: The complete guide to design, delivery, and improvement*, (New York: Teachers College Press, 2003), 8.

complete guide to design, delivery, and improvement, Judith L. Johnson argues, “But why hold up lecture-based classroom education as the benchmark for evaluating new educational delivery systems? How could they make the status quo the standard for evaluating learning technologies that have so much more to offer.”³⁴

E-learning is forcing educators to rethink the educational experience. The online environment encourages students to think and learn both independently and collaboratively. Educators have “barely begun to appreciate the collaborative capabilities of e-learning and, as a result these capabilities are underutilized.”³⁵

The Internet is changing how we learn. “The potential of the Internet as a learning tool is just beginning to be tapped into as a teaching resource.”³⁶ Using the Internet, one can personalize his or her learning even with a large amount of information. Students are looking to personalize their learning experience in e-learning.³⁷

Although online courses have a wealth of possibilities, “E-learning in many institutions is remarkably ad-hoc.”³⁸ They have created online courses quickly in response to the competition among other institutions, weakening their educational quality. Many educational institutions do not recognize the potential of online courses.

³⁴ Ibid, 8.

³⁵ D.R. Garrison and Terry Anderson, *E-Learning in the 21st Century: A framework for research and practice*, (London: RoutledgeFalmer, 2003), 22.

³⁶ Fisher, *Designing Courses*, 14.

³⁷ Ibid, 14.

³⁸ Mark Nichols and Bill Anderson, “Strategic E-Learning Implementation,” *Educational Technology & Society* 8.4 (2005), 1.

CHAPTER 3: DESIGNING FOR E-LEARNING

“Clutter and confusion are failures of design, not attributes of information.”

Edward Tufte, 1997 interview

3.1 TYPOGRAPHY

The way a designer uses text can significantly influence the user’s experience. Since textual information dominates most web pages, typography can be deemed the “heart and soul of a website.”³⁹

Typography has an important responsibility in design because it plays a dual role. On a formal level, typography functions as shape, texture, point, and line. But typographic forms also contain verbal meaning.⁴⁰ Typography can communicate a verbal message and type can function as the dynamic element in the composition.

3.1.1 WEB V. PRINT

Type looks different on screen than type on paper. The viewer sees the text on the monitor differently because text on a printed page is nearly the opposite of viewing text on screen.⁴¹ Text on a monitor is seen from light coming from behind. The viewer can see the text even in the dark—not so for print typography.

Onscreen, fonts are only 72 dpi (dots per inch). Monitor display is course in comparison to the printed page. In print, serif fonts are easier to read in heavy text

³⁹ Thomas A. Powell, *The Complete Reference: Web Design 2nd Ed.*, (Berkeley: McGraw-Hill/Osbourne, 2002), 418.

⁴⁰ Poppy Evans and Mark Thomas, *Exploring the Elements of Design*, (New York: Thomas Delmar Learning, 2004), 31.

⁴¹ Wendy Peck, *Great Web Typography*, (New York: Wiley Publishing Inc., 2003), 146.

passages and sans serif for headlines. The horizontal lines on serif characters have been proven to guide reader's eye along the lines in print.⁴² But this attribute that makes it easier to read in print, makes it more difficult to read on screen. For example, Web course developers need to choose fonts with open interior spaces (counters), and large x-heights (the height of lowercase letters in a font). The developer should also open the letter and line spacing to make individual characters more legible. Variability may be the most distinctive characteristic of Web typography. "Web pages are built on the fly each time they are loaded into a Web browser."⁴³ However web and print typography share the same mission—clear communication. Whether on paper or on screen, good design is clear and persuasive.⁴⁴

3.1.2 FONT SELECTIONS

When selecting fonts remember that the web has limitations. A web browser can only show fonts that have been installed on that computer. The computer will use the default font if the font is not installed.

The standard serif fonts include:

Times New Roman

Georgia

Courier

⁴² Peck, *Great Web Typography*, 7.

⁴³ Patrick J. Lynch and Sarah Horton, *Web Style Guide: Basic design principles for creating web sites*, (New Haven: Yale University, 1999), 79.

⁴⁴ Alex W. White, *Effective Typography for Electronic Publishing Second Edition*, (New York: W.W. Norton & Company, 1999), 164.

The standard sans serif fonts include:

Arial

Verdana

Helvetica

Geneva

It would be unusual for a computer not to have one of the standard web fonts. Some of these fonts have been developed specifically for web use. Matthew Carter has developed Georgia and Verdana, which have become standards for web fonts.⁴⁵

The course designer should use a sans serif for the body text. The clean lines of a sans serif typeface do not as easily strain the “monitor-weary eyes” of the user.⁴⁶

Designers usually prefer Arial or Verdana for the body text. Carter designed Verdana specifically for viewing on a monitor. The more common choice for body text is Verdana because it is more rounded with fewer diagonals than Arial. Diagonal lines often appear jagged on the computer screen. Arial is more compact. For headlines and subheads, Arial displays better than Verdana because Arial’s characters pack tightly on the line.⁴⁷

When selecting fonts, it is important not to use too many. Limit font choice to 2-3 fonts. Traditionally, designers have held use to only two types of fonts in a document—typically a serif, and a sans serif.⁴⁸ The contrast between fonts needs to be obvious enough. For example, the average user might not be able to tell the difference between

⁴⁵ Jeremy Vest, William Crowson, and Shannon Pochran, *Exploring Web Design: An in-depth guide to the art and techniques of web design*, (New York: Thomson Delmar Learning, 2005), 54.

⁴⁶ Peck, *Great Web Typography*, 74.

⁴⁷ Ibid, 74.

⁴⁸ Powell, *The Complete Reference*, 470.

Arial and Helvetica. The designer should not establish the type hierarchy on subtle differences.

Lastly, the designer needs to consider the implied feeling of the font. Serif typefaces have a formal, scholarly appearance, while sans serif typefaces have an informal appearance.⁴⁹

3.1.3 TYPE READABILITY/LEGIBILITY

Legibility is the characteristic of the typeface that allows the viewer to distinguish one character from another, while readability is the ease with which the viewer can read larger sections of text (words, sentences, paragraphs). A designer can make the type of a legible typeface unreadable. An illegible typeface will always be unreadable. This section will discuss how the course designer can avoid text legibility and readability mistakes.

Line spacing (leading), line length, and word spacing (tracking) all affect type readability. Line spacing, or leading, simply refers to the vertical distance between two lines of text (baseline to baseline). “The print rule of thumb is to set line spacing around 1/3 to 1/2 above the type size—so if using 12pt font, set line to 18pt or greater.”⁵⁰ However, line spacing depends on many factors. When lines of type are *too* widely spaced, the reader will have a hard time locating the next line. As a column gets longer, the leading should also increase to maintain a proper ratio of column length to line

⁴⁹ Ibid, 470.

⁵⁰ Powell, *The Complete Reference*, 444.

spacing. Also, typefaces with larger x-heights need more space between lines.⁵¹

Typefaces like Arial or Helvetica need to have more line spacing because they have very large x-heights. In comparison to print, line spacing on the web needs to be greater to improve online text readability.

The lines of text on most web sites are too long for comfortable reading. Ideally, designers should try to keep line length between 10-12 words or 50-70 characters per line. “Reading becomes uncomfortable when there are more than 12 words per line”⁵²

Users on the web will read primarily by recognizing shapes of words. They do not break down the word by each letter and then assemble into a recognizable word. Designers should avoid all uppercase headlines because they form repetitive rectangles, leaving “...few distinctive shapes to catch the eye.”⁵³

Flush right and centered text are difficult to read for large passages of text. Justified text can seem like a good approach, but can create “rivers” of white space within the text. These rivers ruin readability. Few exceptions exist for using centered, flush right or justified text on the web. Text should be flush left for body text.

3.1.4 TYPE HIERARCHY

A well-established type hierarchy will improve the organization of the Web page. A hierarchy will create a level of emphasis of text that matches the importance of the information on the page. The designer should make sure each typeface has a unique

⁵¹ Rob Carter, Ben Day, and Philip Meggs, *Typographic Design: Form and communication third edition*, (New Jersey, John Wiley & Sons, Inc., 2002), 93.

⁵² Lynch, *Web Style Guide*, 68.

⁵³ Ibid, 85.

“voice,” so the hierarchy is obvious.⁵⁴ A designer can create a type hierarchy through color, size, typeface, and position of the type.

Heading and subheadings can be used to draw users into the page as well as provide structure. The designer should make headlines more visually distinctive than the body text. If selected well, pull quotes and highlighted text will emphasize what the content is about.⁵⁵

A page of solid body text will not engage the eye and users will find it hard to quickly grasp its content structure. There are many ways to add emphasis to a block of text, but designers should use these typographical devices sparingly. “If you make everything bold then nothing will stand out and it will seem as if you are **shouting** at your readers.”⁵⁶ It is best to add emphasis using only one parameter at a time. To draw attention to the subheads on you web page, they do not have to be large, bold, and in all caps. This would be equivalent to a man wearing both a belt and suspenders—only one is necessary. Just a small variation is needed to create a visual contrast.⁵⁷

Strong contrast and distinctive patterns attract the eye and the brain of the reader. Good typography depends on the visual contrast between fonts, text blocks, headlines, and white space.⁵⁸

⁵⁴ Powell, *The Complete Reference*, 448.

⁵⁵ Ibid, 473.

⁵⁶ Lynch, *Web Style Guide*, 90.

⁵⁷ Ibid, 90.

⁵⁸ Lynch, *Web Style Guide*, 81.

3.2 COLOR

Color has many functions. It is an important tool for designers and a powerful communicator. Color attracts the eye, carries meaning, expresses personality, frames, highlights content, and brings emphasis. To create visually appealing web pages, the designer needs to use a consistent color scheme—too much color, or erratic color can be confusing.⁵⁹

Color is a powerful feature because people interpret color cues at an unconscious level. Designer's use color to make sure the audience looks in a particular direction, catch the viewer's attention, and direct the user through the site.⁶⁰

Designers need to give color the consideration it deserves. Designer and author of the article "Color My World," says, "90 percent of the Web uses color poorly. It's overdone. There's no sense of color harmony."⁶¹ A large amount of this bad color may come from people without design backgrounds who do not yet understand the "rules" of color.

3.2.1 WEB COLOR LIMITATIONS

Designing on the web presents some limitations in terms of color. A monitor screen is made up of small squares that each contains a red, a green, and a blue light

⁵⁹ Keith Martin, *Web Color Expert*, (Cambridge: Ilex Press Limited, 2003), 13

⁶⁰ Ibid, 6.

⁶¹ Molly E. Holzschlag, "Color My World," www.webtechnique.com/archives/2000/09/desi/ (accessed May 25, 2006)

(RGB). All other colors are created from mixing different intensities of these three colors.⁶²

The images on a computer with a lower quality graphics card or monitor may experience dithering (mixing colors you do have to simulate colors you do not). The following information displays how many colors each graphic card or monitor makes visible.

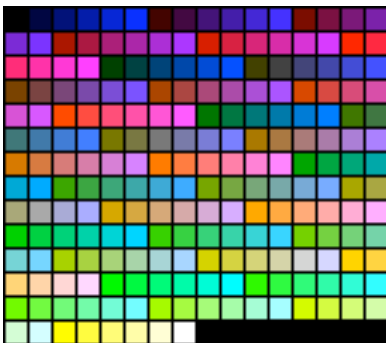
8-bit graphics card or monitor—256 colors visible

16-bit graphics card or monitor—65,000 colors visible

24-bit graphics card or monitor—16 million colors visible

The creation of the web-safe color palette intended to make a particular set of colors visible on almost every color monitor regardless of the graphics card.⁶³ Consisting of 216 colors, the web-safe color palette does not offer the designer much to choose from. The web-safe colors do not offer enough soft muted tones—they are oversaturated and clash with one another.⁶⁴

Figure 2. Web-Safe Color Palette



⁶² Vest, *Exploring Web Design*, 10.

⁶³ Ibid, 89.

⁶⁴ Ibid, 89.

Most designers choose not to use the web-safe color palette anymore. Few computers today are not modern enough to display colors properly. The majority of designers would call “...the web-safe color palette dead. If that seems harsh, consider that the web-safe color palette not only uses just 216 colors, but they aren’t even very good colors to begin with.”⁶⁵

3.2.2 COLOR SCHEMES

The designer must select an appropriate color scheme for the website. Colors make the viewer feel a certain way about the site. Designer’s must get past their personal preferences and select a suitable color scheme for their audience. The colors must look right together. Often referred to as a consistent system of matching hues, a color scheme can also mean a way of using colors. A designer may choose to use different colors in different sections of a website, but uses them in a similar way.

A monochromatic scheme uses only one color. Tints and shades of that color can also be used. While this color scheme seems limiting, it can encourage a designer to get creative in other aspects of the design.⁶⁶

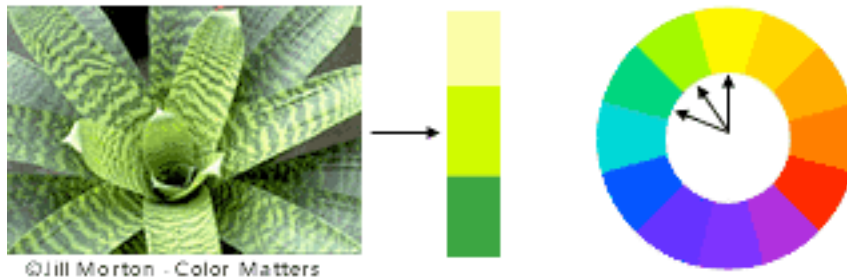
Similar to monochromatic, an analogous color scheme uses 3-5 colors right next to each other on the color wheel. A split-complementary color scheme is eye-catching, and subtler than complementary colors.⁶⁷ The colors that border the complementary color are the color’s split complement.

⁶⁵ Vest, *Exploring Web Design*, 89.

⁶⁶ Ibid, 79.

⁶⁷ Vest, *Exploring Web Design*, 84.

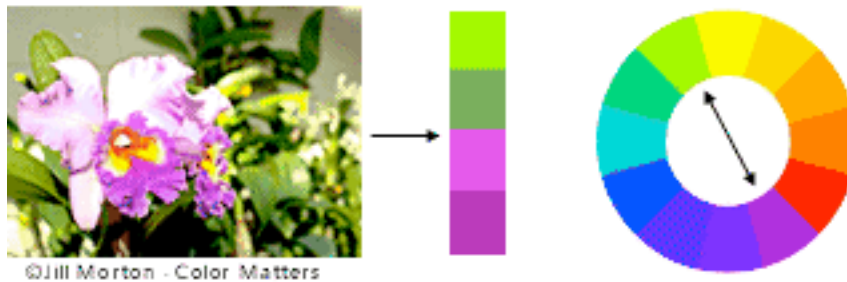
Figure 3. Analogous Color Scheme



Source: (<http://www.colormatters.com/colortheory.html>)

Complementary colors are opposite each other on the color wheel. These colors stand out and vibrate. The strong contrast of complementary colors can cause discomfort for the viewer. While complementary colors get attention, they should be used with restraint. The use of neutral colors can help play down the strong contrast of these colors.⁶⁸

Figure 4. Complementary Color Scheme



Source: (<http://www.colormatters.com/colortheory.html>)

⁶⁸ Ibid, 82.

In a triadic color scheme, the three colors are equal distance apart on the color wheel. A line drawn between all three colors would form a triangle. Many different color combinations work well together. But the designer must select colors that will best suit the website.

3.2.3 PSYCHOLOGY OF COLOR

Color has different meanings for different people. A different color can change the effect of a website. Designers must understand how colors affect viewers, and choose their colors accordingly.

The human psyche interprets the colors around us and gives them meaning. The system shown below is based on the Bourges system of color—divided into four groups of colors (Reds, Yellows, Greens, Blues) that encompass human psychological reactions.⁶⁹ The information in the table (Table 1.) defines the color and explains the psychology of the color.

⁶⁹ “The Psychology of Color,” <http://coe.sdsu.edu/eet/Articles/wadecolor/start.htm> (accessed June 5, 2006).

Table 1. Color Psychology

Name	Definition	Psychology
Mauve	Bold, Stylish, Impressive	City color, cultured, classic
Pink	Lovely, Sensitive, Feminine	Abandons logic for sensitivity
Crimson	Powerful, Aggressive	Threatening, demands attention
Scarlet	Desirable, Believable, Friendly	Dramatic, yet warm (holidays)
Bright Red	Dangerous, Exciting, Loud	Danger, battle
Coral	Wild, Fiery, Explosive	Out-of-control, very noticeable
Orange	Tangy, Tart, Zesty	Nutrition, warning for hazards
Amber	Mellow, Abundant, Fertile	Comfortable, yet distinctive
Gold	Rich, Sunny, Joyful	Warm color, assoc. with power
Yellow	Sour, Anxious, Sharp	Startling, overuse can make viewer uneasy
Lime	Fresh, Naïve, Clean	Youthful
Leaf Green	Healthy, Natural, Secure	Life, self-confidence
Sea Green	Mature, Strong, Restless	Wise, ancient
Emerald	Brilliant, Expensive, Eternal	Splendid like a jewel
Teal	Primitive, Intuitive, Ancient	Strong, free

Cyan	Analytical, Cold, Intelligent	Cold, direct, to the point, articulate
Sky Blue	Calm, True, Honest	Philosophical, non-threatening, peace, tranquility, good will
Dark Blue	Moving, Soulful, Compassionate	Heart, emotion
Violet	Serious, Thoughtful, Reflective	Meditative, soul searching
Purple	Grand, Royal, Majestic	Excitement, royal (western)

Source: (<http://coe.sdsu.edu/eet/Articles/wadecolor/start.htm>)

Authors Poppy Evans and Mark Thomas explain in their book, *Exploring the Elements of Design*, the universal meanings of these basic hues as described in this table (Table 2.).

Table 2. Color Psychology

Name	Meaning
Purple	royal, sophisticated, cultivated, enigmatic quality, associated with valor
Blue	serene, and reliable, as in “true blue”
Green	growth, nature, life giving, also color of money
Yellow	sunlight, citrus, energy, gold and wealth, intelligence and reason
Orange	active, appetizing, hot, associated with sunsets and autumn leaves
Red	exuberant, romantic, associated with blood, danger, imagination all of its suggestive qualities can be described with the word passion

Source: (Evans, Exploring the Elements of Design, 100)

In general warmer colors (yellow, orange, red) can cause a higher arousal in the viewer than cooler colors (blue, green, violet). Warmer colors seem closer to the viewer. To enhance perception and depth, use warm colors in the foreground and cool colors in the background.⁷⁰

Colors can act upon the body as well as the mind. Red can raise blood pressure and stimulate senses, while blue has the opposite effect on the body.⁷¹ Blue calms the mind.

⁷⁰ “Color Psychology, <http://www.pantone.com/products.asp?idArea=16> (accessed June 5, 2006).

⁷¹ “Color Psychology”

3.2.4 SELECTING COLOR

Colors can inform and at the same time make a site more interesting. But the designer has many considerations when choosing colors. As seen in the previous section, the designer should consider the implied meanings of each color. Designers should avoid color combinations that do not provide enough contrast, and in turn affects usability.

Color sets the mood. The designer's choice of color is very important. The color is used to divide the page, direct the viewer around the page and please the eye.⁷² While many colors would work as background colors for text, "...white is a standard on the Web for the same reason it is a standard in print. It works! There is no better background for text than white. Period."⁷³

Some colors should be avoided, or at least used in small quantities. Labeled as color's worst offender, yellow (pure bright lemon) is the most fatiguing color. Bright colors reflect more light, resulting in excessive stimulation of the eyes—making yellow an eye irritant.⁷⁴ However, yellow can be a great color if used correctly. The human eye notices yellow before any other color. A softer tint of yellow works best, or a smaller quantity.⁷⁵

Color directs the eye to the most important areas on the page. The designer must identify what the user should see first, and where the eye should move next. The time the viewer's attention should be held in each area should also be determined.⁷⁶ Too many colors make it difficult for the user to focus and find anything on the page, but too little

⁷² Peck, *Great Web Typography*, 34.

⁷³ Ibid, 34.

⁷⁴ "Color Matters" www.colormatters.com/colortheory.html (accessed June 5, 2006)

⁷⁵ "Color Matters"

⁷⁶ "Color Matters"

color can be dull. The designer must strive for harmony when selecting colors for the web.

3.2.5 IMAGES

Raster or bitmap images on computer monitors can only display 72-96 pixels/in. Raster images are made out of pixels, and each pixel can be a different color. But if the designer stretches the raster image, it becomes evident the image is made out of pixels. Reduce images proportionally to avoid a squashed look. When saving images for the Web always use 72 pixels/in. Vector images are resolution independent and not created from pixels. A vector image does not lose quality on the web.

Jeremy Vest, author of *Exploring Web Design*, explains the different file formats used on the web in the table below. He also explains how each file format handles color information.

Table 3. File Formats

File Format	Pros	Cons
<p>JPEG</p> <p>Responsible for developing standards for the digital compression of images. Can contain up to 16.7 million colors, ideal for images that contain wide range of colors. Permanently throws away small parts of image each time it is saved resulting in loss of quality—more data removed, smaller it gets. When you save JPEG image you control how much data thrown away.</p>	<p>Handle a lot of color info, discard unnecessary data to make file smaller</p>	<p>Permanently lose data, does not work well for images with small number of colors</p>
<p>GIF</p> <p>Can contain up to 256 colors, color managing called indexing (organized list of all the necessary colors) If it needs a color not on the list it uses the closest color it can find. Ideal for simple, solid color images, and line drawings. The image data is left intact (nothing thrown away). Supports transparency and animation.</p>	<p>Only uses colors that are necessary, does not throw away data, supports transparency, used to display moving graphics</p>	<p>Does not support complex images, banding will occur with images that have gradients (harsh transition from one color to another)</p>
<p>PNG</p> <p>Developed by an Internet committee to be free of patents, may be the new GIF. Developed to do the work of both a GIF and a JPEG. WWW Consortium approved PNG to replace GIF (so officially GIF a nonstandard now) However, many web designers are not creating PNG images, GIF used far more often.</p>	<p>PNG incorporate best qualities of JPEG and GIF into on file format—preserve good image quality, support many colors, transparency</p>	<p>Not widely used, not widely supported by web browsers</p>

Source: (Vest, Exploring Web Design, 15-17)

3.2.6 OTHER COLOR CONSIDERATIONS

Designers have many factors to take into account when choosing colors. The designer should also consider color blindness. One out of every twelve people has a color deficiency. While almost exclusively confined to males, the most common type of color blindness is red-green (inability to tell the difference between red and green).⁷⁷ Maintain contrast to avoid color confusion among color blind individuals. If an online course relies on color cues for navigation, color blind individuals may find it difficult to get around in the site. Vischeck (www.vischeck.com) lets web designers check their web pages for color blindness visibility. Below is an example of red-green colorblindness.

Figure 5. Red-Green Color Blindness



Strawberries



Strawberries as they would appear to someone with red-green colorblindness

Source: (<http://www.vischeck.com/info/wade.php>)

⁷⁷ Vest, *Exploring Web Design*, 90.

Men and women also have different color preferences—they react differently to color. While blue is a favorite color for many, women prefer red to blue and men vice versa. Not only do they prefer different colors but “Women’s color tastes are thought to be more diverse than men’s.”⁷⁸

3.3 LAYOUT

Anyone can create a website—that is why the WWW is full of poorly designed websites. “Like a bathroom wall, the Web is there for anyone who wants to make a mark.”⁷⁹ But one can learn a lot from bad design.

Users most commonly receive information from web sites visually. The same can be said for online course sites. The viewer looks at the screen and takes in information in the form of text, color, graphics, etc... Given that the ability to see is clearly very important, so is need for a good layout.

3.3.1 PRINCIPLES OF DESIGN

Designers use the principles of design to organize the structural elements (shape, space, line, etc...) of design. Emphasis makes navigating less confusing by telling the viewer what is important. Contrast is an essential element of emphasis. It generates interest, guide’s the viewer’s eye, makes the site easier to navigate, and draws attention to a certain part of a page. Placing different things such as colors, shapes, textures, or sizes

⁷⁸Vest, *Exploring Web Design*, 110.

⁷⁹ Vest, *Exploring Web Design*, 2.

next to each other, creates contrast. Since contrast directs users' attention to a certain area of the page, it also guides their behavior to some extent. A page without obvious cues to structure the information for the user, such as a page of solid text, will repel the eye.⁸⁰

Contrast also works to create a balanced design. If an area of the design needs more weight, try increasing the contrast. If the area appears too heavy, reduce it. The elements on a site should not lean too heavily to one side. However, a perfectly symmetrical balance of elements is discouraged because asymmetrical compositions tend to have a greater feeling of visual tension.⁸¹ The designer should strive for the right balance of visual elements.

Designers also use rhythm and repetition in their work. Repetition is defined as "...repeating identical or similar forms in a consistent spatial relationship and creating an overall pattern of equal weight."⁸² The repetition of design elements, along with the consistent use of type and graphic style will help the user navigate the site easily. Unlike repetition, using a variety of forms and spatial intervals creates rhythm—rhythm is creating a variety in repetition. Mathematician and philosopher Alfred North Whitehead observed, "the essence of rhythm is the fusion of sameness and novelty; so that the whole never loses the essential unity of the pattern, while the parts exhibit the contrast arising from the novelty of their detail."⁸³ Rhythm can create a sense of movement as well as establish a pattern and texture. Both repetition and rhythm create visual interest.

⁸⁰ Ibid, 35.

⁸¹ Vest, *Exploring Web Design*, 40.

⁸² Philip B. Meggs, *Type & Image*, (New York, John Wiley and Sons Inc., 1992), 97.

⁸³ Ibid, 97.

One of the most important decisions designers face is where to place design elements. Proximity is the position and space given to the elements in the composition. This principle deals with controlling relative size and distance from one element to another based on common increments and shared attributes.⁸⁴ When the elements are placed well, the design will create a visual continuity and an aesthetic harmony.

3.3.2 ELEMENTS OF DESIGN

The elements of design are the design components, the content, which the designer must organize in a dynamic, logical and visually interesting way.

Shapes used must reflect the intent of the message. Generally, shapes are considered positive figures that displace space.⁸⁵ The designer must also remember the space around design elements must be designed—the space around figures has shape too. When a design element is placed onto a page, the negative space around that element is activated.

The line, a moving path of a point, can curve or lay straight. As a design element, the line can serve many functions. Line can be used as an edge. The viewer may find an implied line very engaging.⁸⁶ An implied line is visually *suggested* by an arrangement of other elements in the design.

Although design elements can make a site easier to navigate and visually pleasing, a designer must avoid graphic embellishments. “Overuse of graphic emphasis

⁸⁴ Evans, *Exploring the Elements of Design*, 15.

⁸⁵ Ibid, 20.

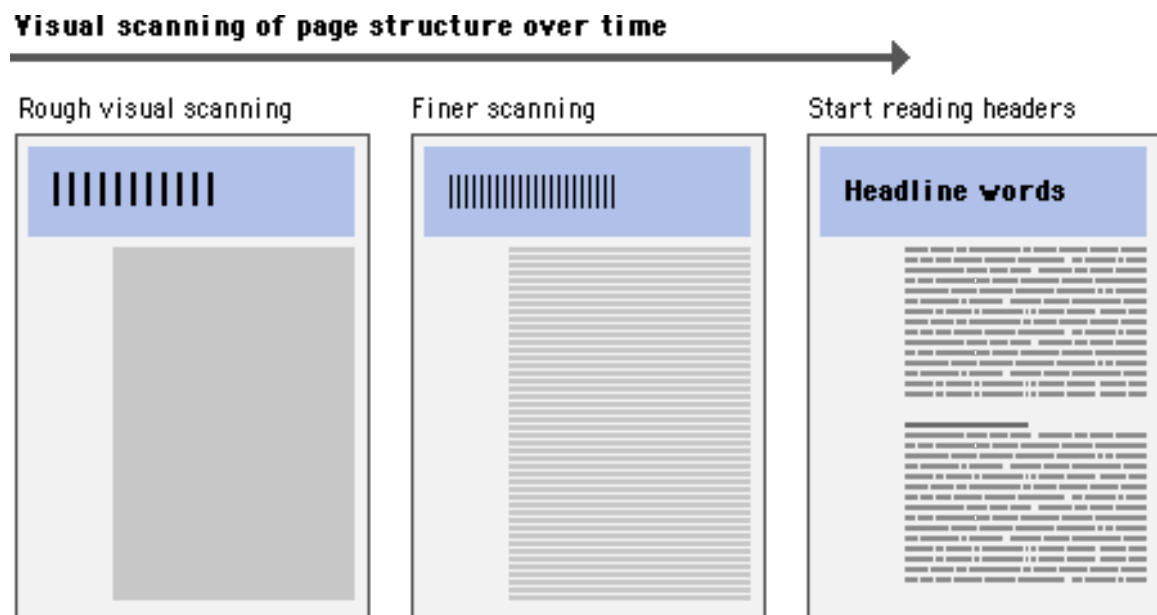
⁸⁶ Ibid, 22.

leads to a ‘clown pants’ effect in which everything is garish and nothing is emphasized.”⁸⁷

3.3.3 VISUAL ORGANIZATION

When organizing the different elements, the designer needs to think about the way the user’s eye should move through each page and the site. Without good visual direction, the user will find it hard to navigate. A primary task of graphic designers is creating a strong, consistent visual hierarchy. This hierarchy emphasizes the important elements, and organizes the content in a logical, predictable manner. “Graphic design is visual information management, using the tools of layout, typography, and illustration to lead the reader’s eye through the page.”⁸⁸

Figure 6. Visual Scanning of Page Structure Over Time



The first page represents a rough visual scanning, the second a finer visual scanning, and the last page the viewer starts reading the headers. At first, readers see pages as large masses of shape and color. Next, readers start to pick out specific information, and lastly they begin to read words and phrases.

Source: (<http://webstyleguide.com/page/hierarchy.html>)

The page does not flow well if the eye zigzags all over the place. A ‘S’ or ‘U’ flow line is easier on the eye and easier to use.⁸⁹ To control visual direction think of how the viewer’s eye will flow through the page, cluster similar items together, and let the most important elements lead the eye through the site. Long before the Web, “...technical writers discovered that readers appreciate short “chunks” of information that can be located and scanned quickly. This method for presenting information translates well to the Web.”⁹⁰ The type of content should suggest how it is organized and subdivided.

Central to good design, visual organization has many factors to consider. Designers need to know how to manage both the surface elements (that are seen) and the hidden structures.⁹¹ It is essential designers know how viewers experience visual information. Elements such as shape, line, and color are seen. Transparent or subliminal structures such as grids, theme, and eye movement achieve harmony.⁹²

⁸⁹ Vest, *Exploring Web Design*, 46.

⁹⁰ Lynch, *Web Style Guide*, 24.

⁹¹ Ibid, 38.

⁹² Ibid, 38.

Figure 7. Visual Hierarchy

Poor page layout;
no visual hierarchy



Better layout; predictable, modular,
clear visual structure

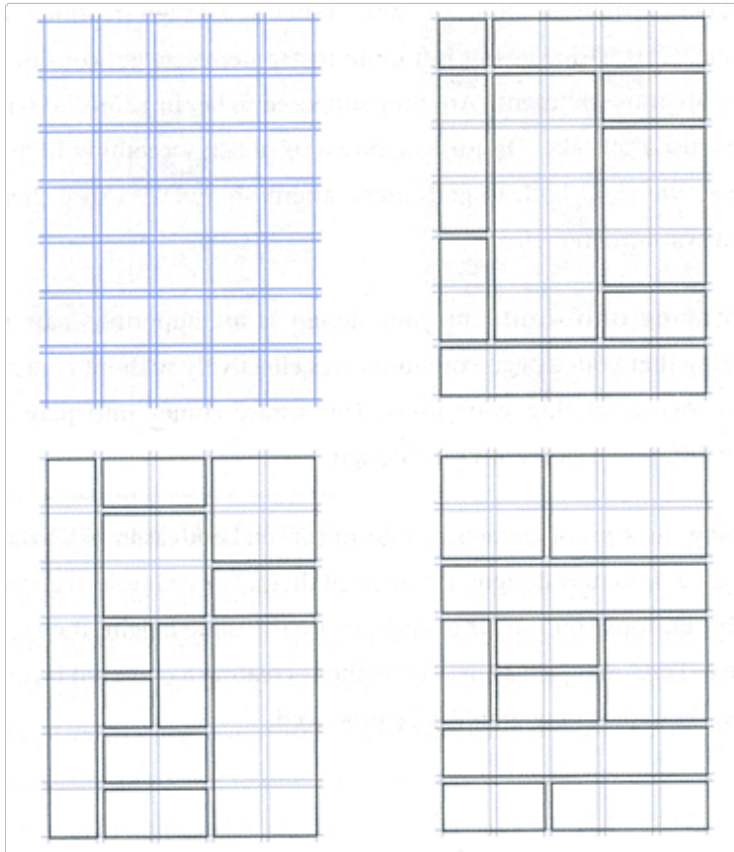


Source: (<http://webstyleguide.com/page/grids.html>)

Grid systems help achieve good organization. The grid is an underlying structure transparent to the viewer's eye. Used for defining key alignments, intersecting points and organizing graphic elements grids can be built from square, rectangular, triangular and even varied sized units.⁹³ Some layouts may only use a few parts of the grid, yet the placement of the elements should remain consistent from page to page.

⁹³ Lynch, *Web Style Guide*, 39.

Figure 8. Grid Layout



Source: (Garret, *The Elements of User Experience*, 148)

3.4 WEB USABILITY

3.4.1 INFORMATION ARCHITECTURE

Typically, people are looking for something on a website. Information architecture involves the design of systems that enable users to find information effortlessly. “But Web site architectures are often called on to do more than just help people find things; in many cases, they have to educate, inform, or persuade users.”⁹⁴

Information architecture usually requires creating categorization schemes that fit the objectives of the site. As long as the categories are the right ones for the users and their needs, “Its not necessary to adhere to a particular number of categories at any level or in any section of the architecture.”⁹⁵

Some people evaluate the quality of a site structure by counting the number of clicks it takes a user to reach a particular destination. But remember that the most important sign of quality is not the number of clicks (although there are limits), but whether each click makes sense.⁹⁶ Each click should be effortless and give users confidence they are going in the right direction. Krug’s second law of usability states, “It doesn’t matter how many times I have to click, as long as each click is a mindless, unambiguous choice.”⁹⁷

⁹⁴ Jesses James Garret, *The Elements of User Experience: User-centered design for the Web*, (Berkeley: New Riders Press, 2002), 126

⁹⁵ Ibid, 94.

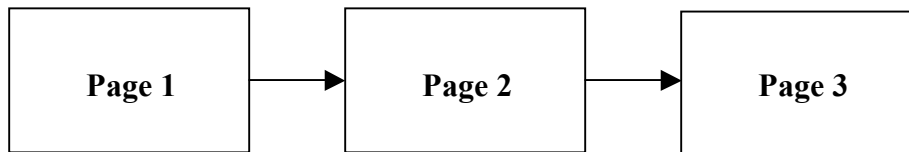
⁹⁶ Ibid, 94.

⁹⁷ Steve Krug, *Don’t Make Me Think: A common sense approach to web usability 2nd edition*, (Berkeley: New Riders Press, 2005), 41.

When designing an online course, the web designer will most likely work closely with the instructional designer. In such a case, "...it is very unlikely that a web-designer will have an in-depth understanding of instructional design."⁹⁸ Instructional designers typically use one of the standard structures.

Common in low-level courses, linear structures (fig. 8) encourage page-by-page use. Sequences must be kept short because learners cannot jump out of the page-by-page sequence.⁹⁹

Figure 9. Linear Structure



Source: ("Creating Learning Materials for Open and Distance Learning," 160)

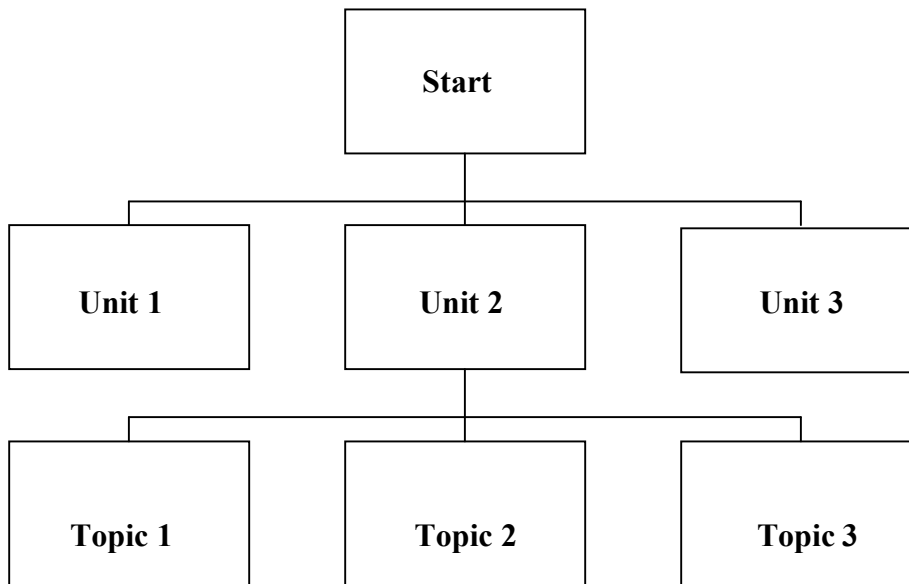
Many online course websites use a grid structure, structuring the site by course unit. This can be done using one of two basic approaches. The first approach, learners have access to any unit and any topic (within a unit) at anytime (fig. 9). This type of structure mimics the traditional textbook course, because learners can "flip" through the site and look at any page at any time. The second approach to a grid structure allows learners access to the units, but only linear access to the topics (fig. 10). Students must complete the first topic before they can have access to the next topic.¹⁰⁰

⁹⁸ "Creating Learning Materials for Open and Distance Learning: A handbook for authors and instructional designers," (Vancouver: Commonwealth of Learning, 2005), 160.

⁹⁹ Ibid, 161.

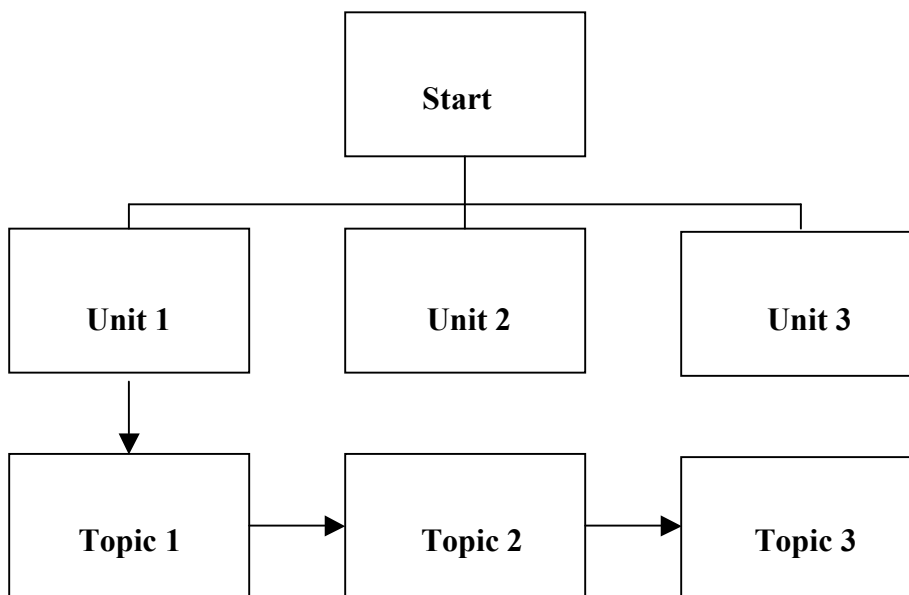
¹⁰⁰ Ibid, 161.

Figure 10. Grid Structure with Direct Access to Units and Topics



Source: ("Creating Learning Materials for Open and Distance Learning," 161)

Figure 11. Grid Structure with Direct Access to Units, Linear Access to Topics



Source: ("Creating Learning Materials for Open and Distance Learning," 162)

Most sites on the Internet are free structures, allowing users the ability to move from page to page in any order they like ('surfing'). However, few education sites use this structure. In distance learning, the most successful online course sites "...progress through a carefully planned set of learning activities in which the content and difficulty are precisely matched to the learners' prior knowledge and current capacity for learning."¹⁰¹ In a free exploration site learners can find themselves absorbed in a topic unrelated to the material they should be studying. In the table below, site structure is based on two variables: the narrative of the content, and the length of the users' interaction with the site.¹⁰² Teaching sites intended for an extended period of use should use a grid structure (Fig. 10) rather than a linear one.

Table 4. Site Types Based on Narratives and Use

	Linear narrative	Non-linear narrative
Brief period of use	Training—use of linear structure	Reference—use a free structure
Extended period of use	Teaching—use a grid structure	Self-education—use a free structure

Source: ("Creating Learning Materials for Open and Distance Learning," 163)

An online course usually provides more high-level and in-depth information than training applications. Links are a powerful aspect of any site, but can cause a distraction for students trying to get through the online class material. If the online course provides

¹⁰¹ "Creating Learning Materials," 163.

¹⁰² Ibid, 163.

links to Web-based resources outside of the local site, the designer might consider grouping the links on a separate page outside of the main body of material.¹⁰³

3.4.2 NAVIGATION

Navigation provides the user a way to get from one point to another. Additionally, navigation should help users have a sense of where they are in the site. Designers need to create a clear, simple, and consistent navigation because people won't use a website if they cannot find their way around it.¹⁰⁴ In an online course the student cannot just exit the site if they are frustrated with the navigation. However, if students have too much trouble with the course site, they can always drop the class.

In navigating a site, users make their way through a hierarchy using signs to guide them through. Typically, the homepage will have a list of the site's main sections and under the site's main sections, the user can choose from a list of subsections.

Krug notes there are three "oddities" of Web space: no sense of scale, no sense of direction and no sense of location. Unless the site is small, users do not know how big a site is. Huge areas could go unexplored. A website also has no sense of direction—no left, right, up, or down. Web users are usually referring to the hierarchy when they say "up" or "down." Web users also have no sense of location. Krug remarks, "In physical spaces, as we move around we accumulate knowledge about the space, we develop a sense of where things are and take shortcuts to get to them."¹⁰⁵ A well-designed

¹⁰³ Lynch, *Web Style Guide*, 33.

¹⁰⁴ Krug, *Don't Make Me Think*, 51.

¹⁰⁵ Ibid, 57.

navigation compensates for this sense of being lost. It does this by “...embodying the site’s hierarchy, creating a sense of ‘there.’”¹⁰⁶

There are different ways the navigation lets users know where they are. A “you are here” indicator (Fig. 12) highlights the user’s current location in whatever form the navigation (lists, menus, navigational bars, etc...) appears on the site. The “you are here” indicator will lose its values as a visual cue if it is too subtle.¹⁰⁷ Similar to “you are here” indicators, breadcrumbs (Fig. 13) also show viewers where they are. However, breadcrumbs show the path the user takes to a location in the site, whereas “you are here” indicators show the user where they are within the site.

Figure 12. "You Are Here" Indicator



Source: (http://www.usabilityfirst.com/glossary/term_113.txt)

¹⁰⁶ Krug, *Don't Make Me Think*, 59

¹⁰⁷ Ibid, 74.

Figure 13. Breadcrumbs



Source: (<http://www.webdesignpractices.com/navigation/breadcrumb.html>)

When viewing a site, Krug says the user should be able to answer the following questions without hesitation:¹⁰⁸

What site is this? (Site ID)

What page am I on? (Page name)

What are the major sections of this site (sections)

What are my options at this level? (Local navigation)

Where am I in the scheme of things? (“You are here” indicators)

How can I search?

¹⁰⁸Krug, *Don't Make Me Think*, 86.

Figure 14. Locating Important Aspects of a Website



Source: (Krug, Don't Make Me Think, 86)

It is important that every page clearly communicates where the user is and where the user can go. If designed well, a web site's navigation tells users exactly where to begin and what their options are. Navigation must also communicate the relationship between the elements it includes, the relevant differences between the links, and what links are more important than others.¹⁰⁹ The importance of navigation is stressed in Krug's statement, "Navigation isn't just a feature of a Web site; it is the Web site..."¹¹⁰

¹⁰⁹ Garret, *The Elements of User Experience*, 126.

¹¹⁰ Krug, *Don't Make Me Think*, 59.

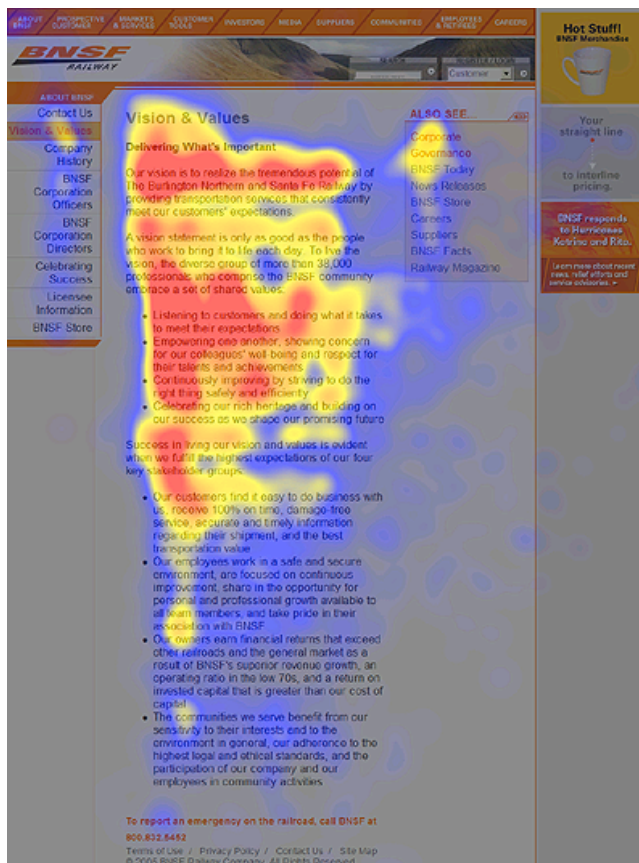
3.4.3 USER EXPERIENCE ON THE WEB

When designing a Web site, the designer must know how people use the Web. Users scan the text rather than read it in its entirety. “One of the very few well-documented facts about Web use is that people tend to spend very little time reading most Web pages. Instead, we scan (or skim) them, looking for words or phrases that catch our eye.”¹¹¹ Students may spend more time reading the text in an online course, but their habit of skimming through text onscreen could extend into their course site as well. It is important the designer illustrates to the user what information is most important. As the user scans through, he or she could miss a critical piece of information because the designer did not bring attention to it. Breaking up pages into clearly defined areas allows users to quickly decide which areas of the page to focus their attention on, and what areas do not need their attention. According to Krug, “Several eye-tracking studies of Web page scanning suggest that users decide very quickly which parts of the page are likely to have useful information and then almost never look at the other parts—almost as though they weren’t there.”¹¹²

¹¹¹ Krug, *Don't Make Me Think*, 22.

¹¹² *Ibid*, 36.

Figure 15. Eye-tracking Study



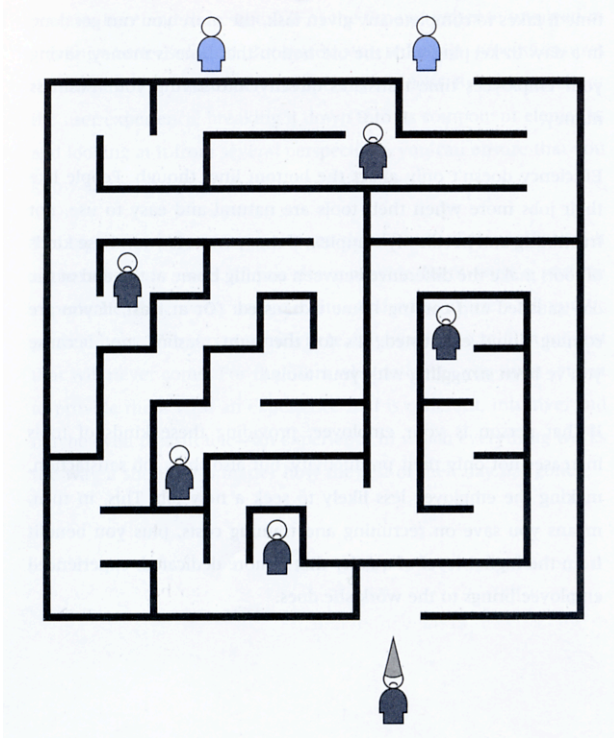
The figure seen on the left is an example of an eye-tracking study. Eyetracking tests can study users reading behavior in great detail. In this particular study the red represents where users looked the most, and blue represents the least-viewed area.

Source: (Jakob Nielsen, “F-shaped Pattern for reading web content,” Alertbox 2006, www.useit.com)

Many users will not take the time to figure out how a site works—they muddle through. As a result, people use Web site in ways the designer never intended. Even though users can “muddle” through a site, it can still make them feel stupid. If users understand how a site works, they have a better chance of finding what they are looking for. When users “get it,” they feel smarter and in control when using the site.¹¹³

¹¹³ Krug, *Don't Make Me Think*, 27.

Figure 16. A Website Can Make a User Feel Stupid



Source: (Garret, *The Elements of User Experience*, 17)

When looking at a web page, the user should be able to understand what the website is and how to use it without having to think about it. A web page should be self-evident and self-explanatory—obvious to the viewer. Krug’s first law of Web usability simply exclaims, “Don’t make me think!”¹¹⁴ At the very least a site should be self-explanatory. Considered the web-design usability guru, Jakob Nielsen defines usability using “five quality components” in his article *Usability 101: Introduction to Usability*.¹¹⁵

Learnability: How easy is it for users to accomplish basic tasks the first time they encounter the design?

¹¹⁴ Ibid, 11.

¹¹⁵ Jakob Nielsen, “Usability 101: Introduction to Usability.” (Alertbox, 2003) www.useit.com (accessed November 8, 2006)

Efficiency: Once users have learned the design, how quickly can they perform tasks?

Memorability: When users return to the design after a period of not using it, how easily can they reestablish proficiency?

Errors: How many errors do users make, how severe are these errors, and how easily can they recover from the errors?

Satisfaction: How pleasant is it to use the design?

Usability is necessary on the Web. If a website is difficult to use, people will leave. If a student finds an online course site difficult to use, he or she may come across many obstacles while trying to learn

3.4.4 OTHER WEB USABILITY CONSIDERATIONS

The course designer has to take many things into consideration to create a course that students can use with ease. Yet, designers must still remember that the site should be created for easy maintenance. Check links to outside Web sources periodically to see if they still work. A low maintenance site will generate less work for the designer and will make it easier to hand over the website upkeep to someone else in the future.

CHAPTER 4: METHODOLOGY

The methodology begins with an analysis of the literature and personal experiences in the field of distance education, to establish a good knowledge base in this area and to understand the role of visual design in online courses.

Attending the conference on Distance Teaching & Learning 2006 in Madison and taking an online course helped the author better understand the field of online learning and online courses.

In addition to researching distance education, research was also conducted in the area of web design and graphic design in general. With a main focus on web typography, web color, and layout, the design chapter builds a strong case for the importance of good design in online courses, as well as serves as a design guide for the online course designer.

After completing the research in distance education and design, the author had to confirm that visual design problems did exist in online courses, and what specifically those problems were. To find these answers, a group of nine cohort students in the Masters of Education program completed a survey comprised of seventeen questions regarding basic demographic information, and questions about the visual design of their online courses. As cohort students in the Master of Education program, the surveyed group takes more online courses than the average student because of the distance they live away from campus. They are experienced online learners. The survey was administered online and students had one week to participate before the online survey closed. Data was analyzed using statistical analysis.

Next, the author applied this research to designing a new prototype for an online course. The ArtIS 301 Foundations of Visual Literacy is used as the pilot course for this study. In this course, students gain a better understanding of visual literacy and why visual literacy is vital in art, science, and other areas of life. It is particularly appropriate to use ArtIS 301 as a pilot study because the students taking this course tend to be visual learners.

The design process is stated in the following chapter (chapter 5). As the final step, two more surveys were administered in order to verify that the prototype design improved the learning environment. Students who had taken ArtIS 301 in the previous semester, answered questions about the visual design of the original course design and the prototype. The results from the survey represented a comparison between the two designs. Six students participated in the first survey (original course design) and five students participated in the second survey (prototype design). Students received both surveys via e-mail. All of the students who participated in the second survey participated in the first survey. Again, the data gathered was analyzed using statistical analysis.

The results for the visual design survey administered to the cohort students are as follows:

Demographics

Table 5. Visual design survey/Gender

Gender	
Male	25% (2)
Female	75% (6)

(1 participant did not respond)

Table 6. Visual design survey/Age

Age	
18-24	12.5% (1)
25-34	75% (6)
35-44	0%
45-54	0%
55-64	12.5% (1)
65↑	0%

(1 participant did not respond)

Question

How many online courses are you taking (include course/s you are taking now)?

Average = **3.375**

(1 participant did not respond)

Color questions

Are there certain color combinations that work best for you when viewing information in online courses? Be as general or specific as you want. (e.g. black on white background, light colors on dark)

Nearly half of the participants preferred black on a white background. Three fourths of the participants prefer the lighter color as the background color, and all participants want colors that contrast.

(1 participant did not respond)

The colors used in your online course enhanced the site, rather than distracted your attention away from the content on the page. (1=Strongly Disagree, 5=Strongly Agree)

(All participants responded)

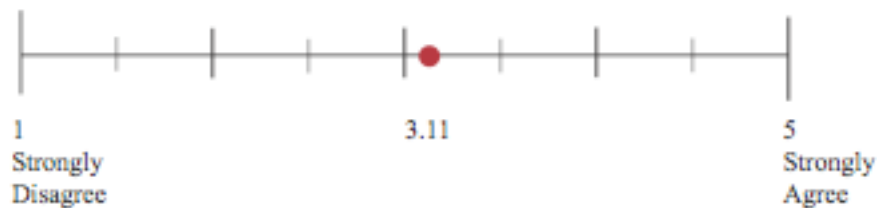
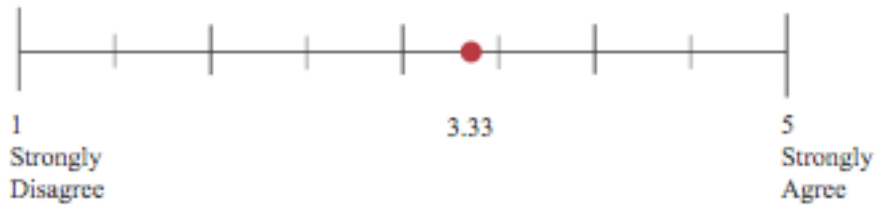


Image questions

The images on your course site were relevant to the content. (1=Strongly Disagree, 5=Strongly Agree)

(All participants responded)



Give an example of a time when an image did not relate to the content on your course website.

None of the participants could recall a specific example.
(5 participants did not respond)

Navigation questions

Does your online course site's navigation use text, icon, text and icon or something else?

Almost all participants' online course/s use text and icon together.
(2 participants did not respond)

Do you prefer your online course's navigation to use text, icon, text and icon, or something else?

Three out of the five people that answered this question prefer both text and icon, while one preferred text and the other icon.
(4 participants did not respond)

Is your online course site's navigation organized into lists, navigation bars, menus, and/or something else?

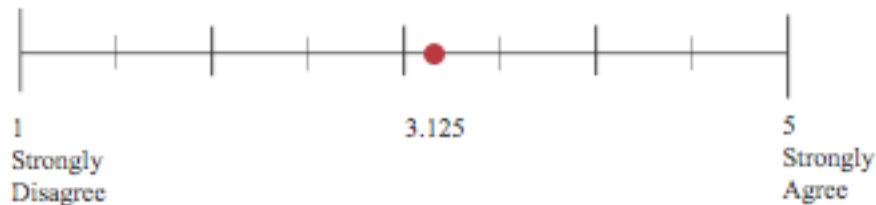
Most student's online course/s navigation is organized using a combination of lists, navigation bars, and menus
(2 participants did not respond)

Do you prefer your online course's navigation organized into lists, navigational bars, menus and/or something else?

After viewing all of their choices, there was not a clear preference. One student commented that it is confusing when a course uses many different ways to create site navigation.
(4 participants did not respond)

Typography questions

The size of the text in your online course site is easy to read online. (1=Strongly Disagree, 5=Strongly Agree)



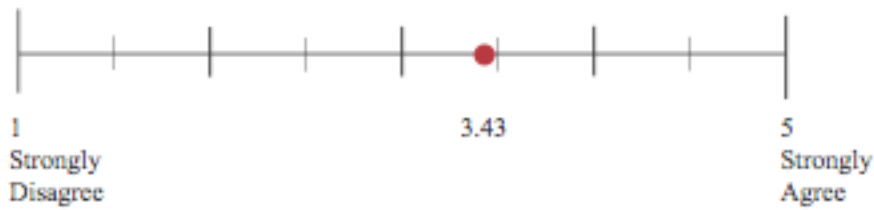
(All participants responded)

How was the body text broken up on the page (e.g. 1 column, 2 columns, etc.) in your online course website?

Three of the seven who replied to this question said their online course/s used one column for the body text. Two others said their course/s used two columns. Based on their answers, it can be determined that the other two respondents misunderstood the question.
(2 participants did not respond)

Was the length of the lines of type comfortable for reading in your online course? (1=Strongly Disagree, 5=Strongly Agree)

(2 participants did not respond)



Visual organization question

Information on a page can be highlighted through the use of visual cues (e.g. color, size, etc...) Did the course designer bring attention to the important information on the site? Explain.

Three out of seven participants said ‘yes’ the course developer used visual cues such as bold, italics, color and size. One participant commented that the course designer did not use visual cues beyond those designed by WebCT. Another participant said that visual cues were not used and they spend a great deal of time reading because of it. The same person thought more visuals and less text would be better.
(2 participants did not respond)

Final question

What would you do (if anything) to improve the design of your online course/s?

Participants suggested less text and more visuals, keeping the design simple, and changing the discussion layout to permit easier scanning.
(3 participants did not respond)

Summary

First and foremost the data suggests that the participants are experienced online learners. The average number of online classes taken by each participant is 3.375.

Although convenient, the creation of most courses using a course management system limits design choices for the course developer. All of the participants had taken a course in WebCT, while a few had also used Blackboard and COSY.

The navigation questions did not give any clear preferences. More students preferred text and icon together, but nearly all of the participants' courses used both text and icon. The icons used in WebCT are not always easy to identify.

Participants most often preferred dark type on a light background. The Likert scale data suggests some room for improvement in color, image selection, text size, and line length. The more interesting statistical information would be the individual scores. On three of the four questions that used the Likert scale, at least one participant gave a ranking of one (strongly disagree). While some students were content with different design aspects of their online course, or least mildly so, other students had complete dissatisfaction with certain design aspects of their course/s.

Visual cues could be used more to highlight important information on the page to guide the viewer's eye through the material. Overall, students want a simple design with more visuals.

CHAPTER 5: ONLINE COURSE DESIGN

5.1 ANALYSIS OF THE CURRENT ONLINE COURSE

This section will display the course design that resulted from the research done in distance education, design, and the analysis of the current course design. As a reminder, ArtIS 301 Foundations of Visual Literacy teaches students the importance of visual literacy in art, science, and other areas of life (Appendix B).

Only one unit of the course is redesigned to get a comparison of both designs. The rest of this section will include an analysis of unit three, “What is a Mental Image,” an analysis of the homepage, the process that lead to the final design of the unit, and lastly the final design.

First, the current course design is analyzed using the design guidelines outlined in the literature review. The following problems are identified:

1. Site ID

Centered on the middle of the page, the site ID (Foundations of Visual Literacy ArtIS301) only appears on the homepage. The site ID should have a better location (e.g. top of page) and should appear on every page.

2. Course Content

A redundancy occurs as the “content area” (sections) appears twice on the homepage. Additionally, the “content area” and the utilities are only found on the homepage.

3. Navigation

If a student wants to go from unit one to unit two, he/she has to go back to the homepage to do so. To add to the navigation problems, the subsections reside within the content—usually in the middle or near the bottom of the page. A student can click a few times into a unit and easily get lost. After a few clicks, the name of the unit is no longer at the top of the page. In many places on the site, the student has to use the back button to navigate through the site. Without “you are here” indicators and breadcrumbs users do not have any sense of where they are in the site. Breadcrumbs will show viewers where they are and the path they took to get to that location.

Like the “content area,” certain utilities can only be found on the homepage as well (e.g. Help, Assignments, Site Map). The utilities sit in a column next to the units (“content area”). Nothing distinguishes the importance of the content such as placement, size, color, etc... A clearer hierarchy of information needs to be established.

The links to home and search are located in the footer—a poor location for two important elements of a site. Not only is search on the bottom, it is a broken link. The site would benefit more from a search bar located at the top of the page as students could quickly type in what they are searching for.

4. Screen Resolution

The screen resolution is an obvious problem. Most computers would only use half of the monitor width to display this webpage—leaving the other half of the screen as unused space. Today most users have a screen resolution of 1024 x 768

pixels or more. While the screen resolution may have been appropriate when the site was created six years ago, it is too small now.

5. Visual Cues

The course site's "icons" represent another design flaw. Students can find these fourteen different icons from time to time next to the text. The icons signal the student to take note of the text next to the icon and follow the instructions the icon refers to. However, at first glance the user might think the icons are clickable (icons usually are). To memorize the meaning of fourteen ambiguous icons is a difficult task. Some of the icons are irrelevant (e.g. "Refer to Text" the course does not have a text book). The homepage includes a link to a page entitled "Explanation of Icons." Students would have to constantly refer to this page to know what the icons represented. This page can only be accessed through the homepage, which disrupts the students' reading and they lose their place in the site. Some of the icons and language used seem inappropriate for a college level course. For example:

Figure 17. ArtIS 301 Icons



"Coming from Left Field"

Meaning: Don't take this idea too literally. It is meant to provide enjoyment and fun.



"Bonehead"

Meaning: This is a bad example of visual literacy. Don't Do This!

Summary

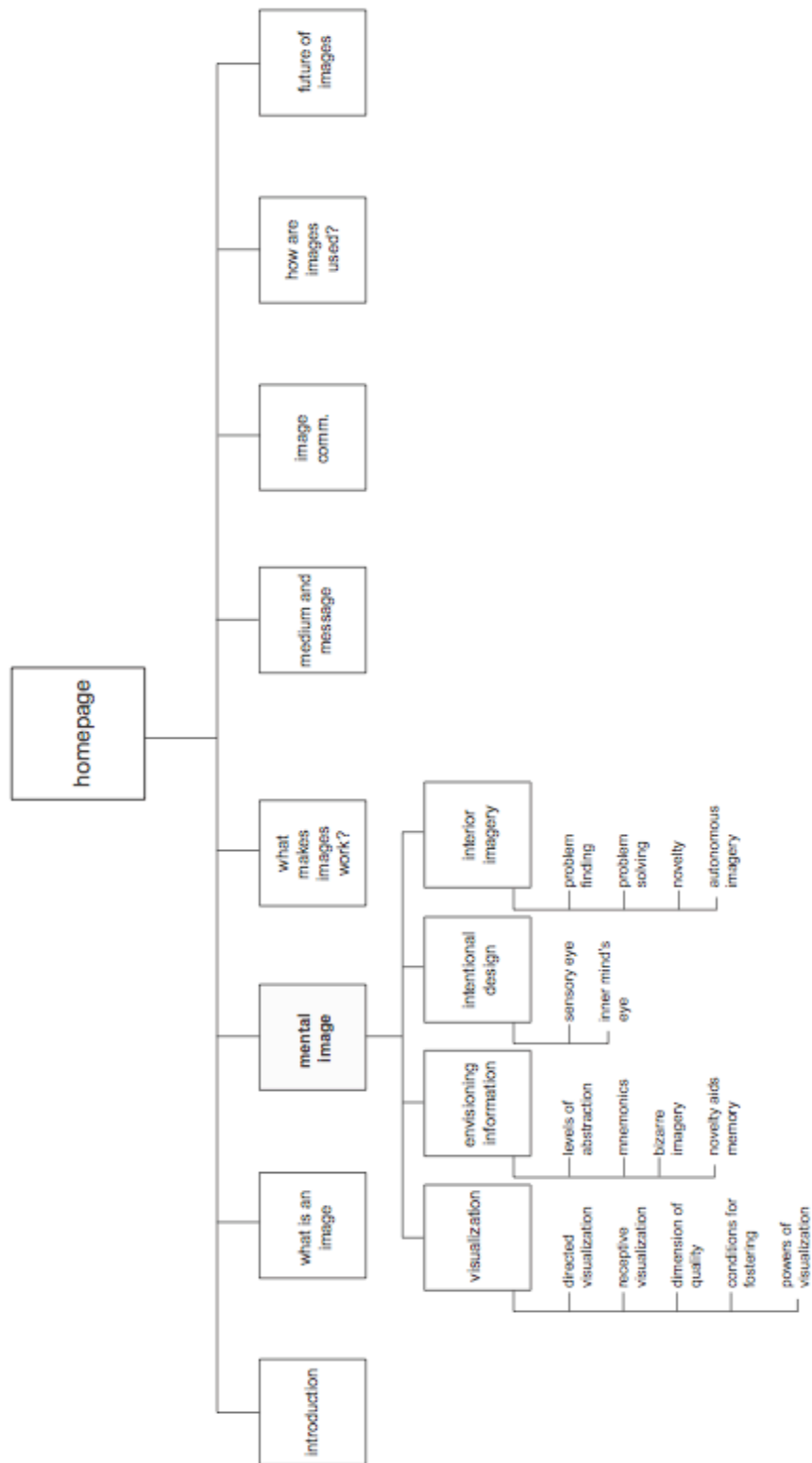
While most of the design problems exist in the navigation and visual hierarchy, the course design also has some problems in the area of typography, color, consistency,

and images. As stated in the typography section of the literature review, body text would be more readable in a sans serif typeface such as Verdana. The color could be used more for emphasis and for visual appeal. The current site uses very little color (white background, light gray, black type, some red) The site has a few inconsistencies. “The Future of Images” (Unit 8) does not look anything like the layout of the previous units. While this study will not judge the text and images by their content, it is noted that some of the images are hard to see and need better placement on the page. Captions under the images would also be helpful.

INFORMATION ARCHITECTURE

Before beginning the design of the prototype, the information architecture needs to be established. A well-structured information architecture will move students through the content efficiently and effectively. This is especially crucial for a successful e-learning experience in the absence of a physical instructor. The following diagram shows the hierarchy of categories and subcategories of the new prototype.

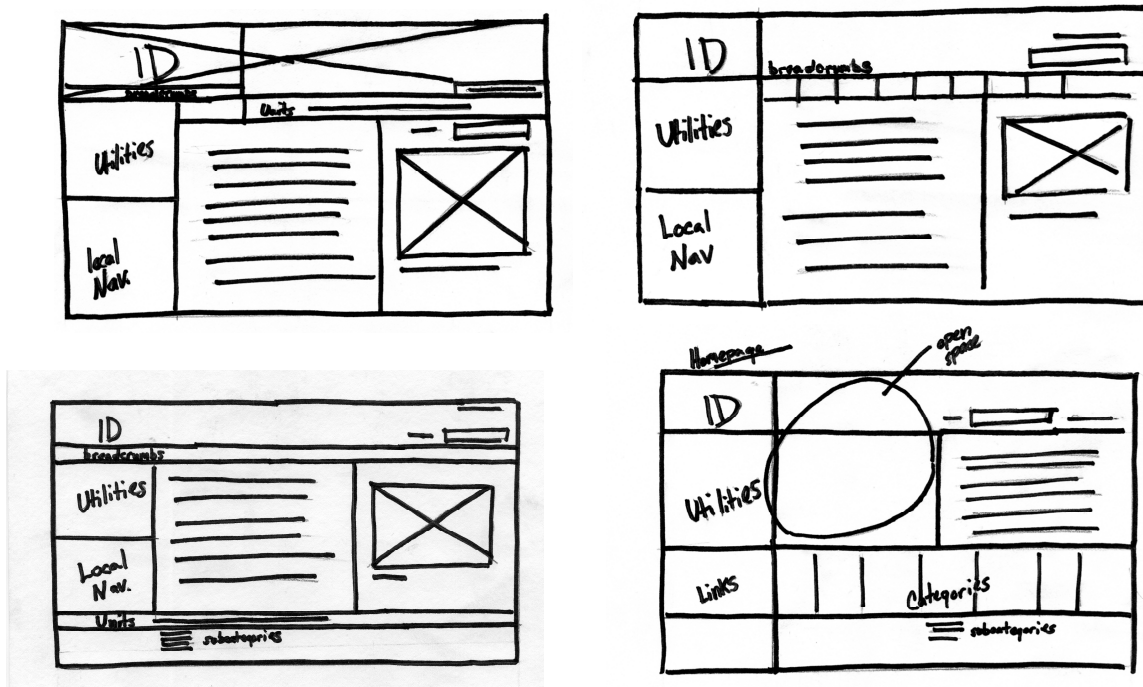
Figure 18. Information Architecture For Prototype



WIREFRAME

While the information architecture outlines how the site will work, the wireframe sketches show that functionality in a more concrete form. First, the designer focuses on individual pages and their components. The designer creates a page layout called a wireframe, which brings together information design, interface design, and navigation design into a unified plan.¹¹⁶ To illustrate this process better, wireframe sketches for the ArtIS301 prototype can be seen below. While the entire process is not illustrated, it gives an idea of the work done at this stage.

Figure 19. Examples of Wireframe Sketch



¹¹⁶ Garret, *The Elements of User Experience*, 136.

SURFACE DESIGN

After working with the arrangement of elements in the wireframe, the designer moves on to the visual representation of these elements, or the surface design. Using the wireframe sketches as a guide, several surface designs were created.

Figure 20. Prototype Design 1

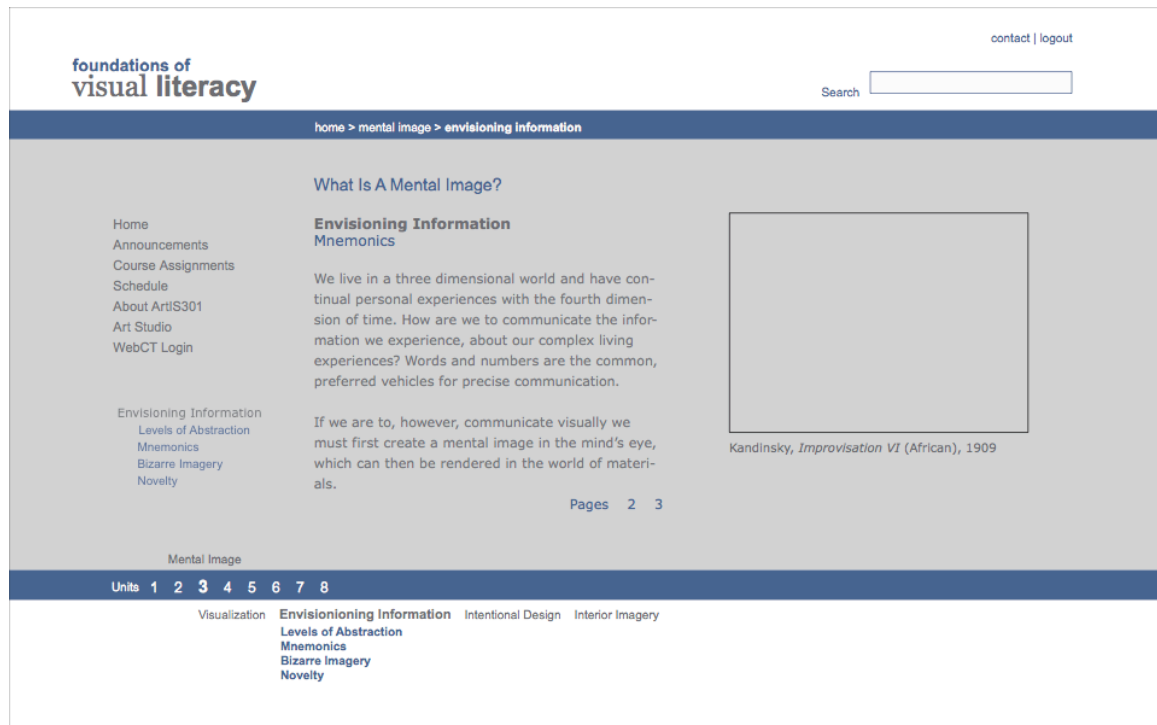


Figure 21. Prototype Design 2



Figure 22. Prototype Design 2, Variation on Navigation

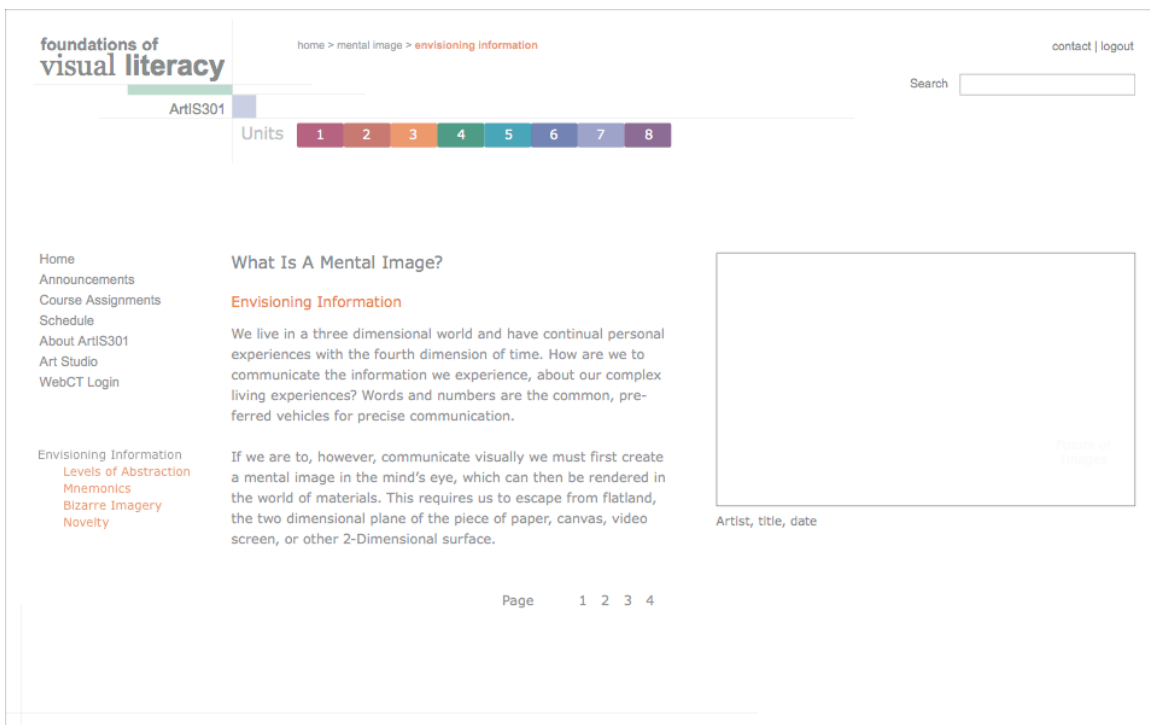


Figure 23. Prototype Design 2, Homepage

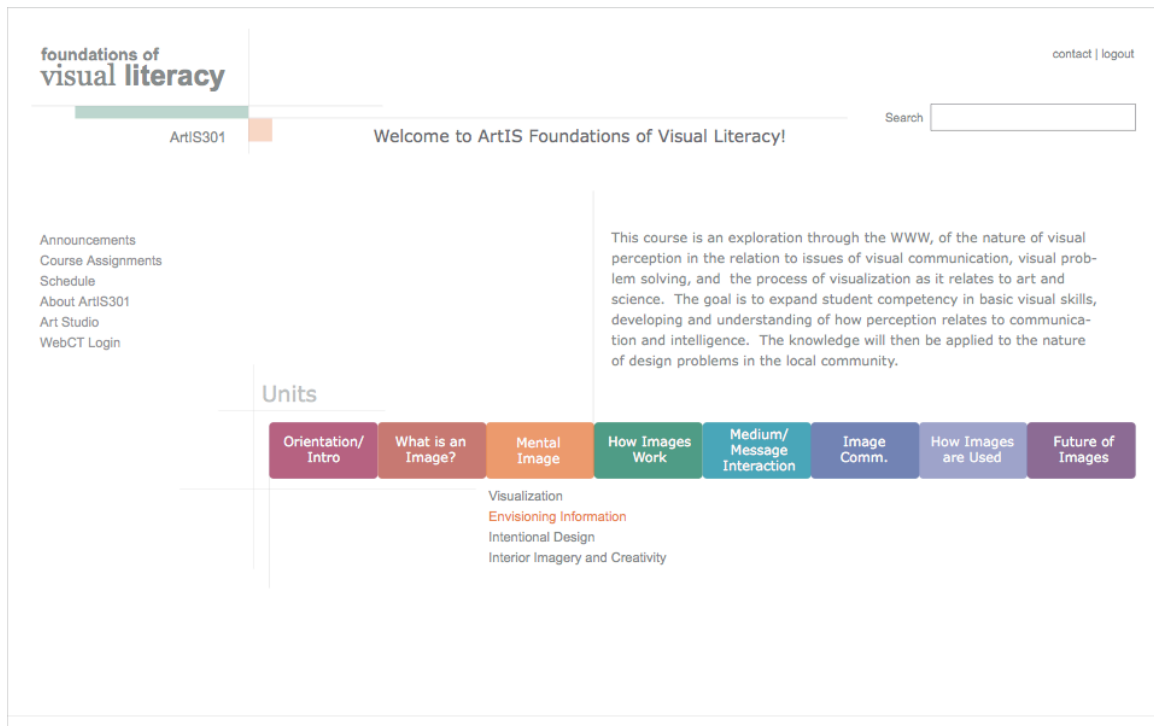


Figure 24. Prototype Design 3



Prototype Design 1 (Fig. 20) suffers from a dull color scheme, which does not provide visual appeal for the viewer or enough contrast between the background color and body text. The main navigation has been simplified, but needs a better location than the bottom of the page. This design layout does not utilize the space at the top of the page.

The white background used in Prototype Design 2 (Fig. 21) creates a better contrast than the first design, thus making the text easier to read. While the main navigation is moved to the top of the page, it still does not have the visual “weight” it needs to bring attention to it. Prototype Design 2, Variation on Navigation (Fig. 22) creates a more visible navigation bar with colored tabs. The site now becomes easier to navigate seeing that the navigation bar is more evident and each unit has a designated color. However, the space has not been utilized well in this design. Particularly, the Prototype Design 2, Homepage (fig. 23) consists of many elements on the page that feel isolated from one another.

Prototype Design 3 (Fig. 24) has a better balance of the design elements, but the navigation at the top of the page is not as clear as the colored tabs from the earlier design. This design needs more color, color contrast, and the advancement of color usage in directing the viewer’s eye. However, this design does utilize the space more effectively than the previous designs. Although transparent to the viewer’s eye, this design has an underlying grid structure that creates a clear visual structure, defines key alignments, and organizes the information on the page.

FINAL PROTOTYPE

After careful review of the three prototype designs, the Final Design Prototype (Fig. 26, 27) is created. The following design changes were considered:

1. Navigation bar

Students can navigate the sections and subsections from the top navigation bar and the student no longer has to search for the link to the subsections in the readings. The navigation was created to help the students have a sense of where they are in the site, and make it clear and effortless to find their way around. Students will find the list of the course units (navigation bar) clearly noticeable at the top of each page.

2. Eliminate Scrolling

The text appears in shorter more manageable chunks because scrolling has been eliminated. Instead, the student will click on the page numbers to advance to the next page. Students may lose their place or find scrolling distracting when they have to do the course reading on a computer screen.

3. Typography improvements

The prototype used Verdana for the body text and Arial for headlines and subheads. When creating a type hierarchy, the designer should use fonts that have a noticeable difference.

Verdana (rounded)

Arial (compact)

The designer limited the number of fonts to three, the line length of the body text to 10-12 words, and avoided using all uppercase headlines. All of the body text on the prototype appears flush left. A type hierarchy is created through use of color,

typeface (Verdana, Arial, Georgia), and the position on the page. The designer made the headlines and subheads more visually distinctive than the body text through color and size, and added emphasis to type using only one parameter at a time (e.g. size)

4. Visual cues/Visual organization

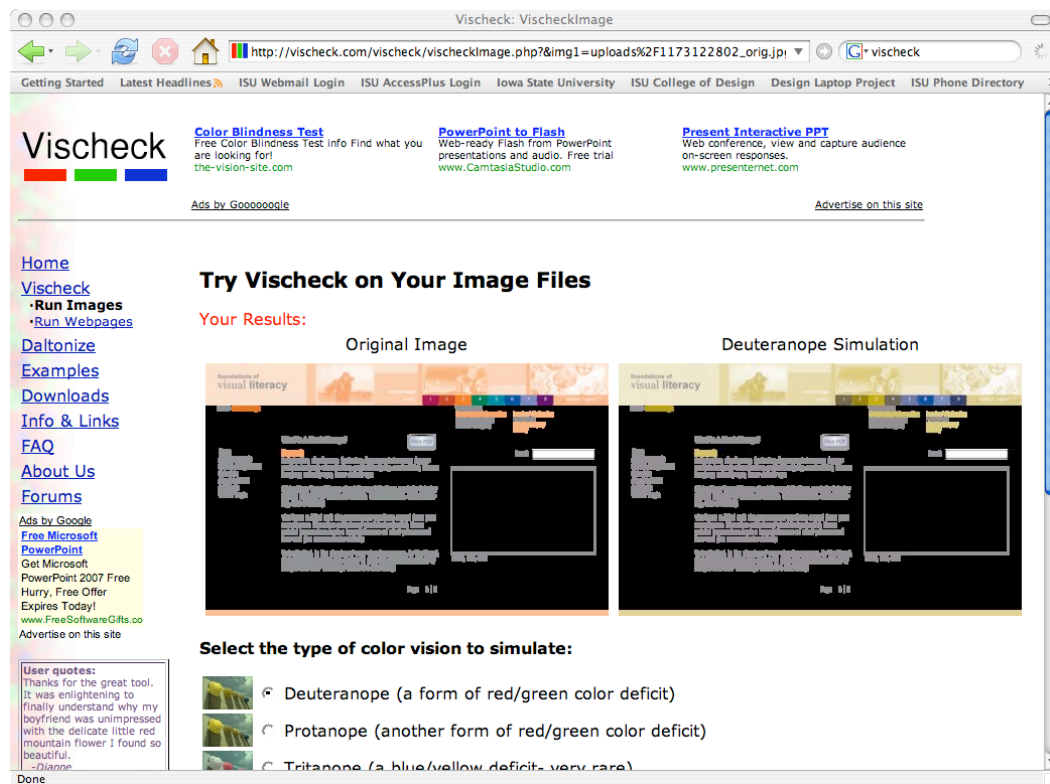
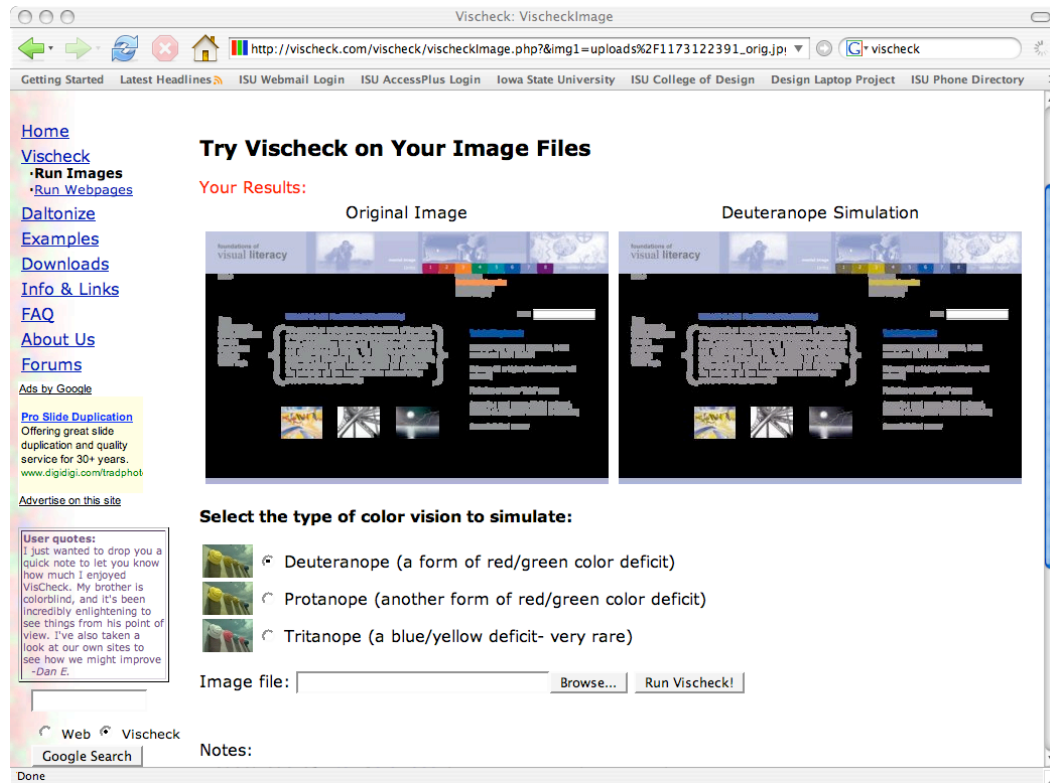
Contrast guides the viewer's eye, makes a site easier to navigate, and draws attention to certain parts of a page. The navigational bar and the dark type on the white background are just two examples of where contrast takes place in the prototype. Important elements (e.g. name of unit, name of subunit) are “highlighted” to lead the viewer through the site.

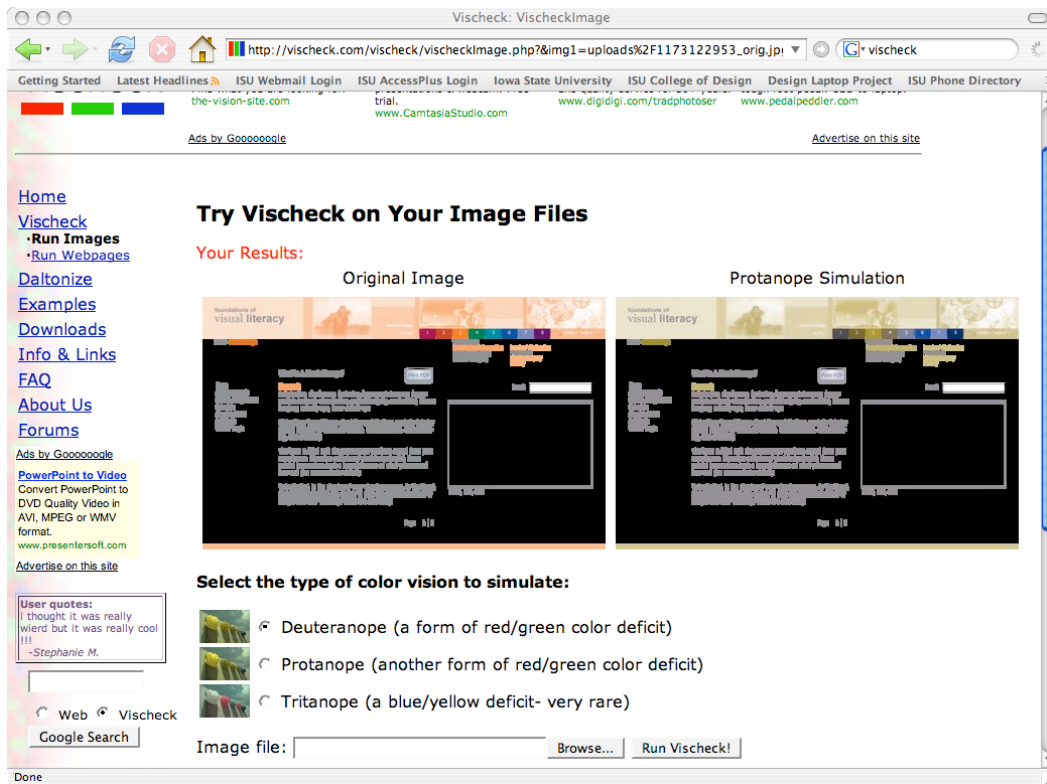
5. New color scheme

The prototype has a consistent color scheme that uses color to highlight content and bring emphasis to certain areas on the page. When selecting color, the designer chose to stay away from bright red hues that viewers can associate with blood, danger and can also raise blood pressure. Bright yellow can also startle viewers, make them uneasy and hurt the eyes. This color was also avoided. The designer used the color in the prototype to inform. Color directs the viewer to different parts of the page, and through the site. Each unit has its own color.

The designer must consider colorblind individuals—especially when the site relies on color cues for navigation. Although someone with a color deficiency might see the colors differently, they would still see a clear distinction between the colors in the visual prototype. Examples of the Vischeck test can be seen in the following figures.

Figure 25. Vischeck Colorblind Tests





6. “You are here” indicators and breadcrumbs

The prototype has a “you are here” indicator and breadcrumbs to give the students a sense of where they are and where they have been.

7. Search bar

The addition of a search bar will assist students in finding information.

8. Captions

Images have captions that list the artist and title of the piece.

9. PDF button

Students can easily print the readings with the addition of the PDF button.

DESIGN ELEMENTS FOR E-LEARNING

It is important to recognize this prototype is different from the average website. The author made these design changes, taking into account that this site would facilitate student learning.

Typography

An online course typically has a substantial amount of content. It is imperative that the students in the course can easily read the text. Students can read the prototype's sans serif typeface (Verdana) faster and with less effort than a serif typeface. The line length (11-12 words) and type alignment (flush left) also assist students in reading onscreen. Additionally, the author eliminated scrolling and divided the content into smaller chunks to facilitate reading a large amount of content online.

Color

Students can identify the sections in the prototype more clearly because they are color-coded. Francis Dwyer, author of *Strategies for Improving Visual Learning* and a well-published researcher in the field of instructional technology, promoted the use of color-coding in instruction. Dwyer's research concluded that color and color-coding facilitates information processing.¹¹⁷ Color was used in this design to signal different content to the student.

¹¹⁷ Barry O. Williams and Lisa R. Stimatz, The origins of graphic screen design principles theory or rhetoric?, *International Journal of Instructional Media* 32.2 (2005), 184

Layout

Students need to quickly and easily understand the organization of the page to avoid confusion and frustration. Visual cues function as an effective organizational tool. The prototype uses color, size, boldness, and position to organize the content. Studies have shown that well organized material onscreen "...improves reading speed, comprehension, effectiveness and efficiency of learning" as well as "...causes learners to develop and maintain interest in lesson content, promotes learner engagement with the material, and facilitates deep processing of important information."¹¹⁸

Visuals enhance learning, particularly in a course where learners tend to be more visual than verbal (e.g. ArtIS 301). The images in the prototype have captions to relate the visuals to the text. When the students can associate the image with the reading, it can help them to remember concepts and ideas.

Web Usability

Good usability assists in immediate learning, low error rates, high skill retention, and high productivity. The main navigation bar allows the student to navigate to any unit or subunit within the online course from any page. Students can find information effortlessly using the color-coded navigation bar to guide them through the site. The breadcrumbs and "you are here" indicators are there to ensure the student does not get lost along the way.

¹¹⁸ Sung Heum Lee and Elizabeth Boling, Screen Design Guidelines for Motivation in Interactive Multimedia Instruction: A survey and framework for designers, *Educational Technology* 39 (1999), 19.

In the online learning environment, Krug's "Don't Make Me Think!" law of web usability still applies. Student's focus should be on the content of the course and not how to use the course site. The author has created a clear and consistent design that will not make students "think."

Figure 26. Final Design Prototype - Home

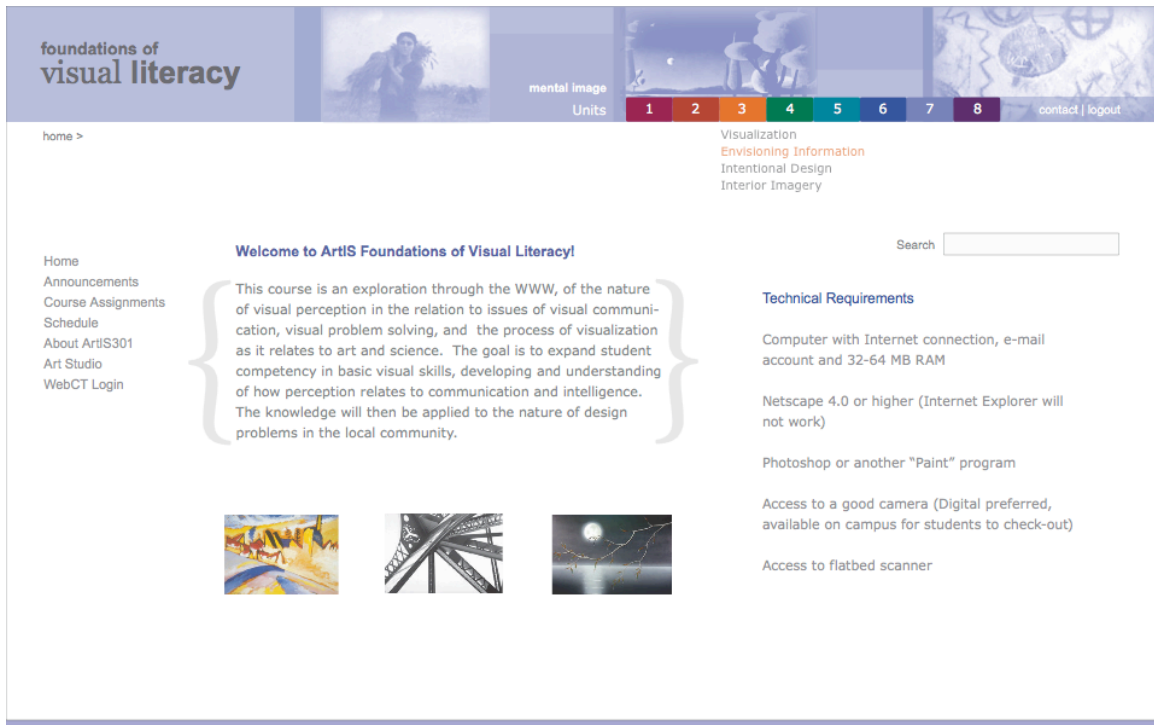


Figure 27. Final Design Prototype - Mental Image

The working prototype includes enough information to see how the site would work if constructed in its entirety. It was created using Adobe Dreamweaver, a web development tool. However, the working prototype was created specifically for students to utilize in completing the final user survey, therefore some elements in the prototype are just visual and do not work. Students can only navigate to subunits within the “Mental Image” unit and they cannot access any of the utilities. The search bar and the “Print PDF” button do not work as well. Nonetheless, students should get a feel for how the redesigned course would both look and operate. Included below are screenshots from the working prototype.

Figure 28. Working Prototype - Home

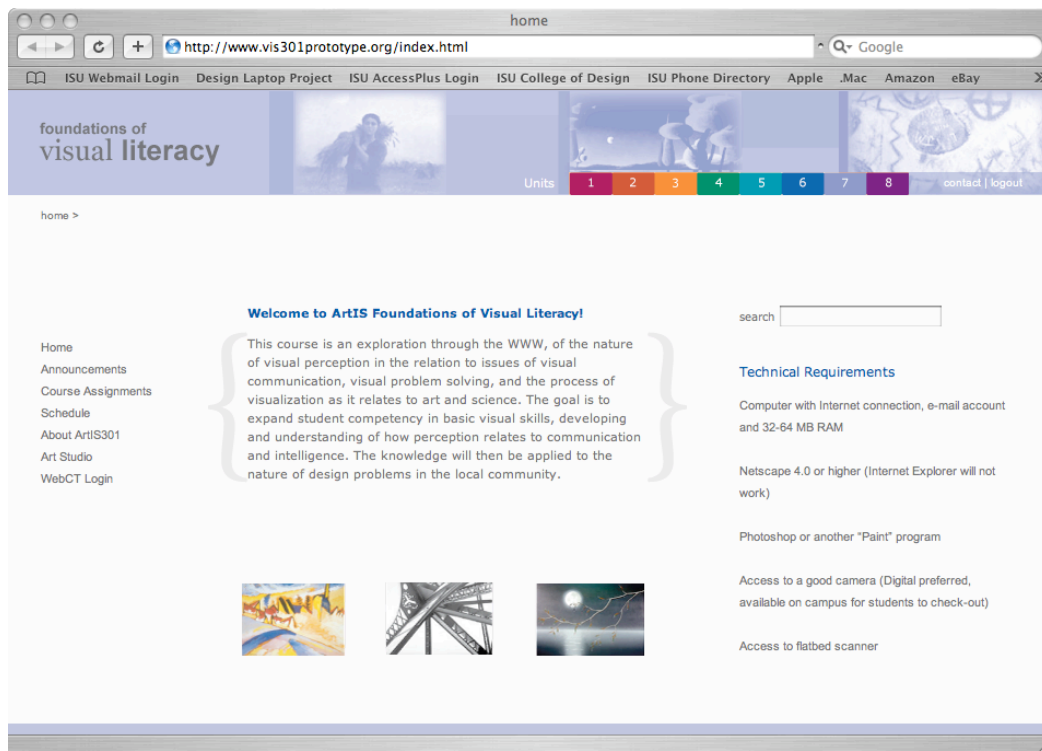


Figure 29. Working Prototype - Mental Image

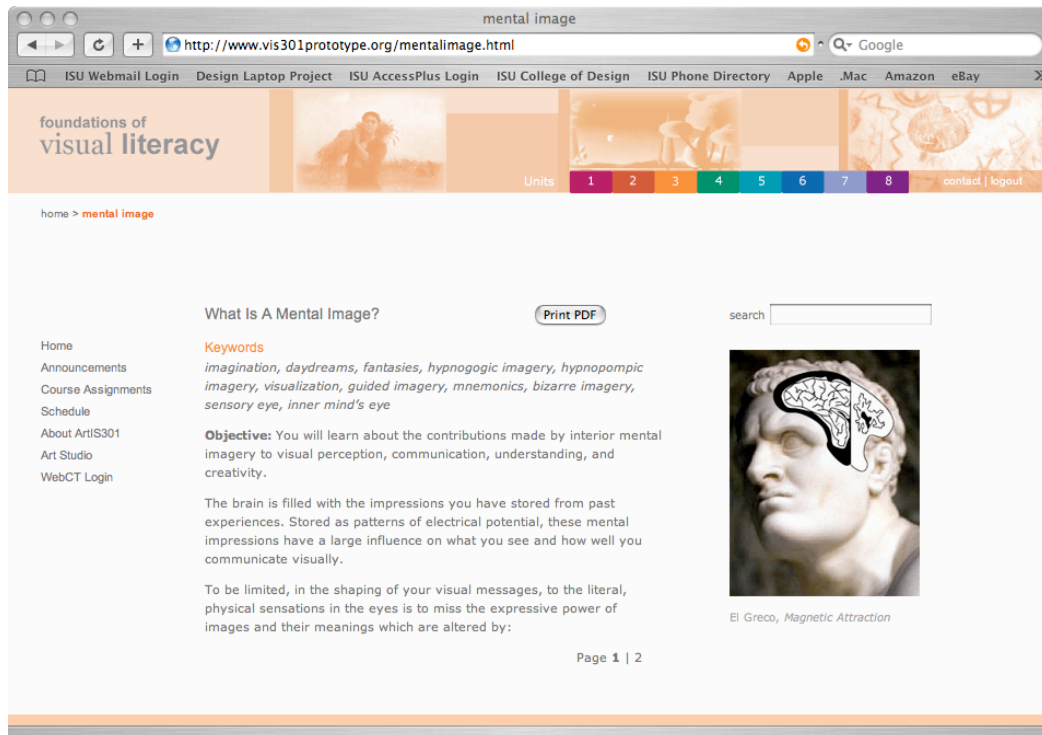
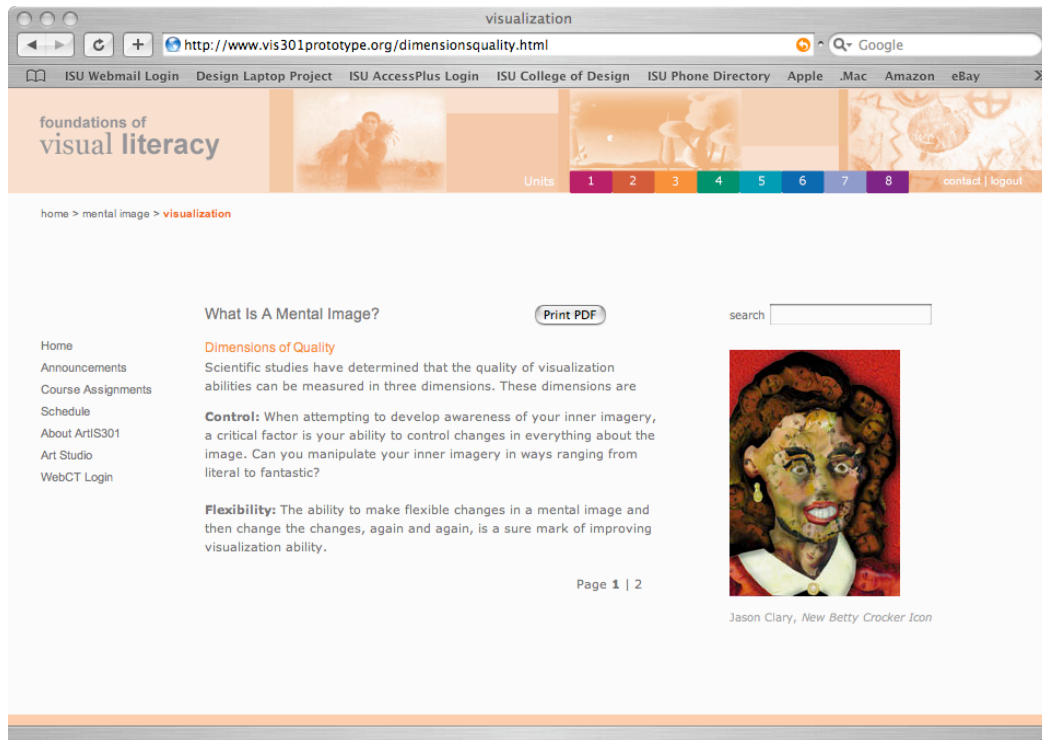


Figure 30. Working Prototype – Dimensions of Quality

5.4 FINAL SURVEYS

Two more surveys were administered to provide information about what visual design aspects work and do not work in both the original course design and the prototype. The results from the surveys represent a comparison between the existing website and the new prototype. Students received the surveys via e-mail and answered sixteen questions about the visual design of both the initial design and the new prototype. To participate, students had one week to return the survey. Six students participated in survey 1 and five students participated in survey 2 (Table 7). Table 8 presents the different age ranges of the students who participated in each survey. The following information shows the result of each question.

5.5 FINAL SURVEY RESULTS

Survey 1 = ArtIS 301 course site

Survey 2 = ArtIS 301 prototype

Demographics

Table 7. Final Surveys/Gender

Survey 1	
Male	33% (2)
Female	67% (4)
Survey 2	
Male	20% (1)
Female	80% (4)

Table 8. Final Surveys/Age

Survey 1	
18-24	83% (5)
25-34	17% (1)
Survey 2	
18-24	80% (4)
25-34	20% (1)

Question

How many online courses are you taking (include course/s you are taking now)?

Survey 1

Average = **1.83**

Survey 2

Average = **2**

The results suggest that the surveyed groups have a similar amount of experience in the online learning environment.

Color questions

Are there certain color combinations that work best for you when viewing information on the [ArtIS 301 course site/ArtIS 301 prototype]?

Survey 1

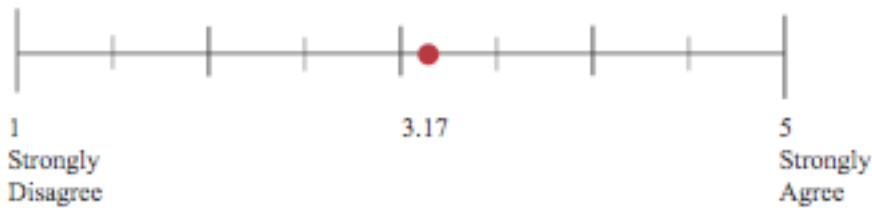
A few participants thought the black type on white worked well. Another student appreciated the red highlights, but felt the gray background was distracting. One student felt that none of the color combinations worked on the site.

Survey 2

One participant found the cool colors visually appealing, while another participant thought the lighter hues opened up the page, making it seem less cluttered. Another participant felt the colors directed the student where they should look first.

The colors used in the [ArtIS 301 course site/ArtIS 301 prototype] enhanced the site, rather than distracted your attention away from the content on the page. (1=Strongly Disagree, 5=Strongly Agree)

Survey 1

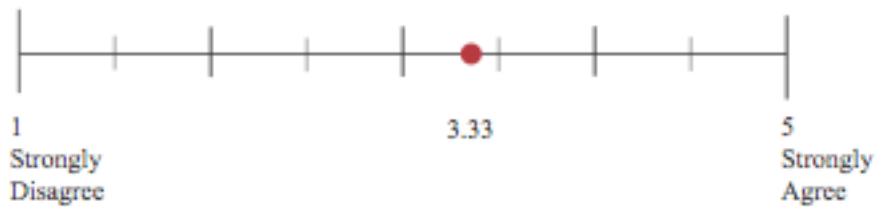


Survey 2



Image questions

The images on the [ArtIS 301 course site/ArtIS 301 prototype] were relevant to the content. (1=Strongly Disagree, 5=Strongly Agree)

Survey 1**Survey 2**

Give an example of a time when an image did not relate to the content on the [ArtIS 301 course site/ArtIS 301 prototype]

Survey 1

One participant said examples of past assignments are outdated and did not help explain what he/she did not understand. This participant missed points because he/she used these examples as guides to help complete assignments. Another participant found the “eye” on each page distracting and did not relate.

Survey 2

No comments

Navigation questions

Does the [ArtIS 301 course site/ArtIS 301 prototype]’s navigation use text, icon, text and icon or something else?

Survey 1

Text

Survey 2

Text

Do you prefer your online course's navigation to use text, icon, text and icon, or something else?

The participants were split between text, icon, and text and icon—there was not a clear choice. A few participants said they have do not have a preference, as long as the navigation is easy to follow and a clear hierarchy is established.

Is the [ArtIS 301 course site/ArtIS 301 prototype]'s navigation organized into lists, navigation bars, menus, and/or something else?

Survey 1

Lists

Survey 2

List and navigational bar

Do you prefer your online course's navigation organized into lists, navigational bars, menus and/or something else?

Again there was not a clear choice between navigational bars, menus, or lists. One participant commented that he/she preferred lists but that they should not be at the bottom of the page as they often were in the ArtIS 301 course site.

Typography questions

The size of the text in the [ArtIS 301 course site/ArtIS 301 prototype] is easy to read online. (1=Strongly Disagree, 5=Strongly Agree)

Survey 1



Survey 2

How was the body text broken up on the page (e.g. 1 column, 2 columns, etc.) in your online course website?

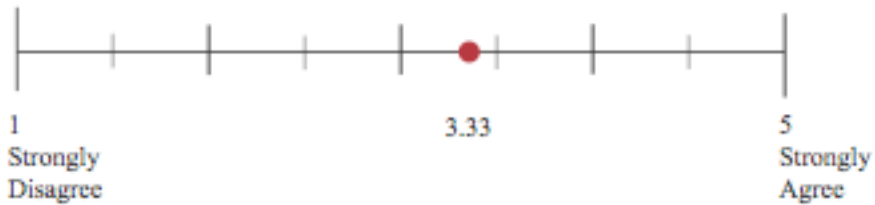
Survey 1

1 column

Survey 2

1 column

Was the length of the lines of type comfortable for reading in the [ArtIS 301 course site/ArtIS 301 prototype]? (1=Strongly Disagree, 5=Strongly Agree)

Survey 1**Survey 2**

Visual organization question

Information on a page can be highlighted through the use of visual cues (e.g. color, size, etc...) Did the course designer bring attention to the important information on the site? Explain.

Survey 1

Several of the participants commented that they were unaware of what information was important in the readings. The alignment between the icons and text are off. One student commented that the use of icons did not bring attention to the text and he/she had to pay close attention to the body of text to find answers for the quizzes. Another student suggested that each unit add a vocabulary list.

Survey 2

One student suggested more variation in text. Other participants pointed out that important information is bolded, the keyword list at the beginning of the unit, and the text is italicized or highlighted the color as the page color to bring attention to certain information.

Final question

What would you do (if anything) to improve the design of the [ArtIS 301 course site/ArtIS 301 prototype]?

Survey 1

Participants suggested a new color scheme, and removing the distracting background image. Many participants commented on the difficulty of navigating the site. Students noted they often lost their place in the reading when they had to go to the homepage to look for something. One student found it difficult because some pages were only accessible through other pages and it was hard to find information because it was linked only in certain pages and not a main menu. Another student suggested that color coordinating the sections would be helpful, as well as making the readings printer friendly.

Survey 2

Participants feel the prototype design is more successful than the original design. They found it less cluttered, easier to read with a balanced use of white space. One participant noted that the prototype was easier to navigate and find what he/she was looking for.

Summary

Data from the final survey clearly show the students preferred the typography of the prototype to the original design. As the research advises, the prototype has a line length of 11-12 words and a sans serif typeface for the body text. The original design uses a serif typeface and has a line length of 5-6 words. Additionally, the original design uses only one font throughout, while the prototype uses three (keeping within the limit of 2-3) Using only one font makes it more difficult to create a type hierarchy.

Students also preferred the color of the prototype to the original design, according to the survey data. The research suggests that too little color can be dull and the students agreed. Students felt the original design lacked color (mostly black, gray, and white). The prototype uses color to direct the viewer to different parts of the page (e.g. subheads, navigation bar) and through the site. Each unit has a designated color to help students navigate through.

Lack of visual cues made finding information difficult on the original design. When the original design did use visual cues (icons), they failed. The icons did not line up correctly with the text and hindered more than they helped. Students thought the “keyword” list on the prototype design would be helpful to identify the most essential information throughout each unit. As proposed in the research, a page without visual cues will repel the eye. The prototype uses boldness, color, and size to bring attention to certain areas on the page.

Many students expressed their frustration with the original site’s navigation. They had to navigate back to the homepage often, losing their place in the reading. To access other areas of the site, they had to navigate back to home first. The navigation

does not have a hierarchy established on the homepage (main sections/unit, subsections/subunits). Navigation should be clear and simple. Clicks should make sense and should make the student feel like they are going in the right direction. The ArtIS 301 site does not do this. Krug said that a site should be able to answer these questions without hesitation.¹¹⁹

What site is this? (Site ID)

What page am I on? (Page name)

What are the major sections of this site (Sections)

What are my options at this level? (Local navigation)

Where am I in the scheme of things? (“You are here” indicators)

How can I search?

On most pages in the ArtIS 301 course site, it would be impossible to answer *any* of these questions. All of these questions could be answered using the prototype.

¹¹⁹ Krug, *Don't Make Me Think*, 86.

CHAPTER 6: CONCLUSION

In this final stage, the author will review the objectives of the research and determine if they were accomplished. The statement below outlines the intentions of this study.

The purpose of this study is two-fold: (1) to establish the importance of using the principals of good design in developing an online course (2) to create a design guide for online course developers.

The purpose of this study was developed from the following problem: visual design has generally been ignored in the construction of online courses. Most online course developers do not have a background in design and many instructors are responsible for the design of their own course.

The “Designing for E-learning” section of this thesis covers basic guidelines in typography, color, layout, and web usability. Given that a person with a background in design usually does not assist in the development of online courses, the online course developer can use this section as a guide to improve the design.

After completing the research in distance education and design, the author had to confirm that visual design problems did exist in online courses, and what specifically those problems were. Nine experienced online learners participated in a survey to determine what visual design hindrances existed in online courses. Results from this survey suggested improvements in all design areas (type, color, layout, and image selection). The author applied the research and survey results to designing a prototype for an online course. To generate a quality design, the author analyzed the current course

design, developed the information architecture, wireframe sketches, surface designs, and a final visual design before creating the working prototype. Many design changes were made in typography, navigation, color, and visual organization. Moreover, the author understood these changes needed to facilitate student learning.

Two more surveys were administered in order to verify that the prototype design improved the learning environment. The results from the survey represented a comparison between the two designs. Student response to the prototype was positive seeing that they preferred all of the design aspects (typography, color, visual organization, navigation) to the original course design. Using the prototype, students discovered they could navigate, find information, and read text with less effort than the previous course design. In contrast, students conveyed frustration and negative reactions to the navigation, visual organization, and image selection of the initial design. The final survey results gives validity to the prototype design, and therefore accomplishes the first purpose of this study. The learning environment will improve when an online course is developed using principals of good design. This study has brought together two different areas of interest: web design and online learning. It has proven to be significant for both fields.

RECOMMENDATIONS

When the course developer is not a designer, he/she can take simple steps to create a better course design and avoid design blunders that can easily distinguish non-designers from designers. The following basic design recommendations are intended for non-designers to comprehend and apply to their online course design.

The course developer should choose a sans serif (Verdana, Arial, Helvetica, Geneva) for large passages of text. Verdana was designed specifically for web use. Keep type alignment flush left, and line length between 10-12 words. Limit font choices to 2-3 fonts.

The “rules” for selecting a harmonious color scheme are not as specific as the guidelines for web typography. Remember when selecting colors to provide enough contrast between them, and use color to direct the eye to where the viewer should look. The following resources are great color guides and will help in selecting harmonious color schemes.

<http://www.colormatters.com/> (Color Matters)

<http://www.colorschemer.com/online.html> (Color Schemer Online)

<http://wellstyled.com/tools/colourscheme2/index-en.html> (Color Scheme Generator)

Establishing a hierarchy of information is essential; it requires emphasizing and clustering similar information. Grid systems will help achieve good organization. The grid (fig. 8) does not need to be complex, but it needs to remain consistent from page to page. Use the grid to organize the different elements of the design, and for key alignments.

The navigation of an online course should be simple and clear. Adding a “you are here” indicator (fig. 12) and breadcrumbs (fig. 13) will help students know where they are within the site and the path they took to get there. The course developer should also base the structure of the course on its intended use (Table 4).

It is a common mistake by a non-designer to get caught up in the many “tools” designers have at their disposal and use too many of them in their design. Avoid using too much color, too many fonts, or graphic embellishments. A designer does not need to make the typography bold, italic, large, and all caps to bring emphasis to it. Add emphasis using only one parameter at a time. Overall, keep the design simple and organized—free of clutter.

While this study looked specifically at improving the learning environment for students taking online courses, further research could generate additional findings in this area. Additional research in this area could be conducted to measure if good design (v. poor design) could have an effect on students’ study time, memory recall, completion rates, achievement and performance in an online course.

APPENDIX A. HUMAN SUBJECT APPROVAL FORMS

For IRB Use Only	Review Date: <u>8 December 2006</u>	IRB ID: <u>D6-611</u>	IRB
	Approval Date: <u>20 December 2006</u>	Length of Approval: <u>1A</u>	
	Approval Expiration Date: _____	FULL Committee Review: <u>NO</u> DFT: <u>0 4 2006</u>	
	EXEMPT per 45 CFR 46.101(b): <u>2</u> Date: <u>12/20/06</u>	Minimal Risk: <u>✓</u>	
	EXPEDITED per 45 CFR 46.110(b) _____	More than Minimal Risk: _____	
	Category _____, Letter _____	Project Closed Date: _____	

ISU NEW HUMAN SUBJECTS REVIEW FORM

SECTION I: GENERAL INFORMATION

ORIGINAL

Principal Investigator (PI): Mandi Pralle	Phone: 641-430-3468	Fax: _____
Degrees: BA	Correspondence Address: 200 Stanton 16d #705	
Department: Art and Design	Email Address: mandip81@iastate.edu	
Center/Institute: _____	College: College of Design	
PI Level: <input type="checkbox"/> Faculty <input type="checkbox"/> Staff <input type="checkbox"/> Postdoctoral <input checked="" type="checkbox"/> Graduate Student <input type="checkbox"/> Undergraduate Student		

Title of Project: Visual Design in Online Courses
Project Period (Include Start and End Date): [mm/dd/yy][12/2/06] to [mm/yy/dd][8/15/07]

FOR STUDENT PROJECTS

Name of Major Professor/Supervising Faculty: Sung Kang	Signature of Major Professor/Supervising Faculty: _____
Phone: 515-294-1669	Campus Address: 282 Design
Department: Art and Design	Email Address: shrkang@iastate.edu
Type of Project: (check all that apply)	
<input checked="" type="checkbox"/> Research	<input checked="" type="checkbox"/> Thesis
<input type="checkbox"/> Independent Study (490, 590, Honors project)	<input type="checkbox"/> Dissertation <input checked="" type="checkbox"/> Class project
<input type="checkbox"/> Other. Please specify: _____	

KEY PERSONNEL

List all members and relevant experience of the project personnel. This information is intended to inform the committee of the training and background related to the specific procedures that the each person will perform on the project.

NAME & DEGREE(S)	SPECIFIC DUTIES ON PROJECT	TRAINING & EXPERIENCE RELATED TO PROCEDURES PERFORMED, DATE OF TRAINING
✓ Mandi Pralle, BA, MFA student 8/25/05	create survey, administer survey	Iowa State University Web Training for Human Subjects Research 8/25/05
✓ Sunghyun Kang, BFA, MA, MFA 8/08/02	oversee study	Iowa State University Web Training for Human Subjects Research 8/8/2002

Add New Row

- ☒ Yes ☐ No Does this project involve human research participants? If the answer "no" is checked, you will automatically move to a question regarding the involvement of radiation producing devices in your project.

SECTION III: ENVIRONMENTAL HEALTH AND SAFETY INFORMATION (EH&S)

- ☐ Yes ☒ No Does this project involve laboratory chemicals, human cell lines or tissue culture (primary OR immortalized), or human blood components, body fluid or tissues? If the answer is "no" is checked you will automatically move to a question regarding the involvement of human research participants in your project.

ASSURANCE


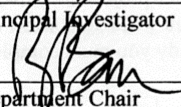
- I certify that the information provided in this application is complete and accurate and consistent with any proposal(s) submitted to external funding agencies.
- I agree to provide proper surveillance of this project to ensure that the rights and welfare of the human subject or welfare of animal subjects are protected. I will report any problems to the appropriate assurance review committee(s).
- I agree that I will not begin this project until receipt of official approval from all appropriate committee(s).
- I agree that modifications to the originally approved project will not take place without prior review and approval by the appropriate committee(s), and that all activities will be performed in accordance with all applicable federal, state, local and Iowa State University policies.

CONFLICT OF INTEREST

A conflict of interest can be defined as a set of conditions in which an investigator's or key personnel's judgment regarding a project (including human or animal subject welfare, integrity of the research) may be influenced by a secondary interest (e.g., the proposed project and/or a relationship with the sponsor). ISU's Conflict of Interest Policy requires that investigators and key personnel disclose any significant financial interests or relationships that may present an actual or potential conflict of interest. By signing this form below, you are certifying that all members of the research team, including yourself, have read and understand ISU's Conflict of Interest policy as addressed by the ISU Faculty Handbook (<http://www.provost.iastate.edu/faculty> .) and have made all required disclosures.

- ☐ Yes ☒ No Do you or any member of your research team have an actual or potential conflict of interest?
☐ Yes ☐ No If yes, have the appropriate disclosure form(s) been completed?

SIGNATURES

 16 Nov 06
 Signature of Principal Investigator Date
 11.17.06
 Signature of Department Chair Date

PLEASE NOTE: Any changes to an approved protocol must be submitted to the appropriate committee(s) before the changes may be implemented.

Please proceed to SECTION II.

ISU IRB # 1	06-611
EXEMPT DATE:	December 8, 2006
Initial By:	jlc

Email Script

Fellow Students:

My name is Mandi Pralle and I am conducting a survey that seeks to find what type of visual design problems exist in online courses. The information I gain from this survey may be used in a larger research study to determine if good design will improve the learning environment in online courses.

I would appreciate it if you could take a few moments to complete my survey. My survey is voluntary, but if you do decide take it, you may skip any question you do not feel comfortable answering. The survey was created using an online survey software, which will ensure that your survey will remain confidential.

Here is the link to the survey:

For further information about the study contact:

Mandi Pralle
mandip81@iastate.edu
(641) 430-3468

Sung Kang (supervising faculty member/major professor)
shrkan@iastate.edu
(515) 294-1669

Thank you for your participation.

Mandi Pralle

Survey

How many online courses have you taken (include courses you are taking now) _____

The following questions will pertain to the visual design of your online course/s. Answer the questions by giving a ranking on a 5 point Likert scale (1=Strongly Disagree, 5=Strongly Agree). Some questions will ask you to write in an answer. If you have taken more than one online course base your answer on your overall experience with online courses.

Are there certain color combinations that work best for you when viewing information on online courses? Be as general or specific as you want. (e.g. black on white background, light colors on dark)

The colors used in your online course enhanced the site, rather than distracted your attention away from the content on the page.

1 2 3 4 5 NA

The images on your course site were relevant to the content.

1 2 3 4 5 NA

Give an example of a time when an image did not relate to the content on your course website.

ISU IRB # 1	06-611
EXEMPT DATE:	December 8, 2006
Initial By:	jlc

Does your online course site's navigation use text, icon, text and icon or something else?
What works best for you when navigating an online course site and why?

What works the least?

Is your online course site's navigation organized into lists, navigational bars, menus, and/or something else? What works best for you when navigating an online course site and why?

What works the least?

The size of the text in your online course site is easy to read online.

1 2 3 4 5 NA

ISU IRB # 1	06-611
EXEMPT DATE:	December 8, 200
Initial By:	jlc

How was the type broken up on the page (e.g. 1 column, 2 columns, etc.) in you online course website?

Was the length of the lines of type comfortable for reading? Explain.

Information on a page can be highlighted through the use of visual cues (e.g. color, size, etc...) Did the course designer bring attention to the important information on the site? If so, how? If not, how can the course designer show the student what information is most important through design?

What would you do (if anything) to improve the design of your online course/s?

For IRB Use Only	Modification Approval Date <u>8 March 2007</u> <u>Exempt</u>	IRB FEB 08 2007
	Continuing Review Approval Date _____	
	Approval Expiration Date: _____	

ISU HUMAN SUBJECTS CONTINUING REVIEW AND/OR MODIFICATION FORM

TYPE OF SUBMISSION: ☐ Continuing Review ☒ Modification ☐ Continuing Review and Modification

Principal Investigator: Mandi Pralle		Phone: 641-430-3468
Degree: BA	Correspondence Address: 200 Stanton 16d #705	
Department: Art and Design	E-mail Address: mandip81@iastate.edu	
Project Title: Visual Design in Online Courses		
IRB ID: 06-611	Date of Last Continuing Review: _____	
IF STUDENT PROJECT		
Name of Major Professor: Sung Kang		Phone: 515-294-1669
Department: Art and Design		Campus Address: 282 Design
		E-mail Address: shrkang@iastate.edu

ORIGINAL

FUNDING INFORMATION:

<input type="checkbox"/> External Grant/Contract	<input type="checkbox"/> Internal Support (no specific funding source) or Internal Grant (indicate name below)
Name of Funding Source: _____	OSPA Record ID on Gold Sheet: _____
<input type="checkbox"/> Part of Training, Center, Program Project Grant – Director: _____	Overall IRB ID No: _____

CONFLICT OF INTEREST

The proposed project or relationship with the sponsor require the disclosure of significant financial interests that present an actual or potential conflict of interest for investigators involved with this project. By signing this form, all investigators certify that they have read and understand ISU's Conflict of Interest policy as addressed by the ISU Faculty Handbook and made all disclosures required by it. (<http://www.provost.iastate.edu/faculty> .)

Do you or any member of your research team have a conflict of interest? ☐ Yes ☒ No
If yes, has the appropriate disclosure form been completed? ☐ Yes ☐ No

ASSURANCE

I certify that the information provided in this application is complete and accurate and consistent with proposal(s) submitted to external funding agencies. I agree to provide proper surveillance of this project to insure that the rights and welfare of the human subjects are protected. I will report any adverse reactions to the IRB for review. I agree that modifications to the originally approved project will not take place without prior review and approval by the Institutional Review Board, and that all activities will be performed in accordance with state and federal regulations and the Iowa State University Federal Wide Assurance.

Mandi Pralle 2/8/07
Signature of Principal Investigator Date

Materials rec'd 3/8/07

Student Projects: Faculty signature indicates that this application has been reviewed and is recommended for IRB review.

Sung Kang 2/8/07 Devin Gment 1 March 2007
Signature of Supervising Faculty Date IRB Approval Signature Date

For IRB Use Only	EXPEDITED per 45 CFR 46.110(b) _____, Category _____, Letter _____
	STUDY REMAINS EXEMPT per 45 CFR 46.101(b) <u>4</u>
	WAIVER of SIGNED CONSENT per 45 CFR 46.117(c) _____
	WAIVER of ELEMENTS of Consent per 45 CFR 46.116 _____
	VULNERABLE POPULATION per 45 CFR 46. _____

ISU IRB # 1	06-611
EXEMPT DATE:	8 March 2007
Initial By:	jlc

Email Script

Participants:

My name is Mandi Pralle and I am conducting a survey on the visual design of the ArtIS 301 Foundations of Visual Literacy course site. The information I gain from this survey may be used in a larger research study to determine if good design will improve the learning environment in online courses.

I would appreciate it if you could take a few moments to complete my survey. My survey is voluntary, but if you do decide take it, you may skip any question you do not feel comfortable answering. To complete the survey, read the instructions at the top of the attached survey, fill in your answers, and send back to mandip81@iastate.edu as an attachment.

For further information about the study contact:

Mandi Pralle
mandip81@iastate.edu
(641) 430-3468

Sung Kang (supervising faculty member/major professor)
shrkan@iastate.edu
(515) 294-1669

Your participation is greatly appreciated.

Mandi Pralle

SURVEY

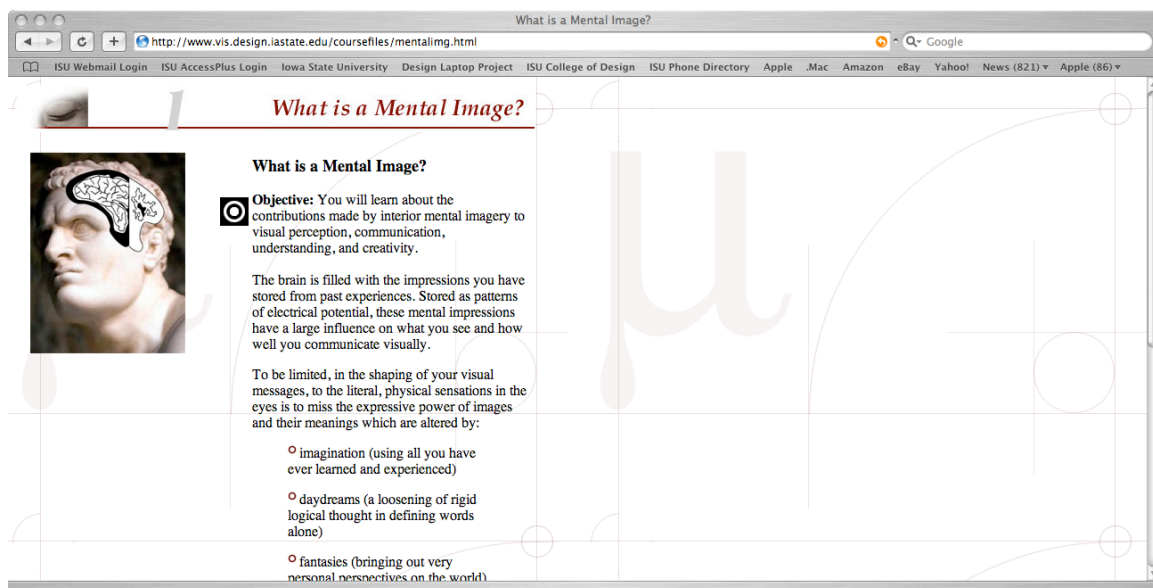
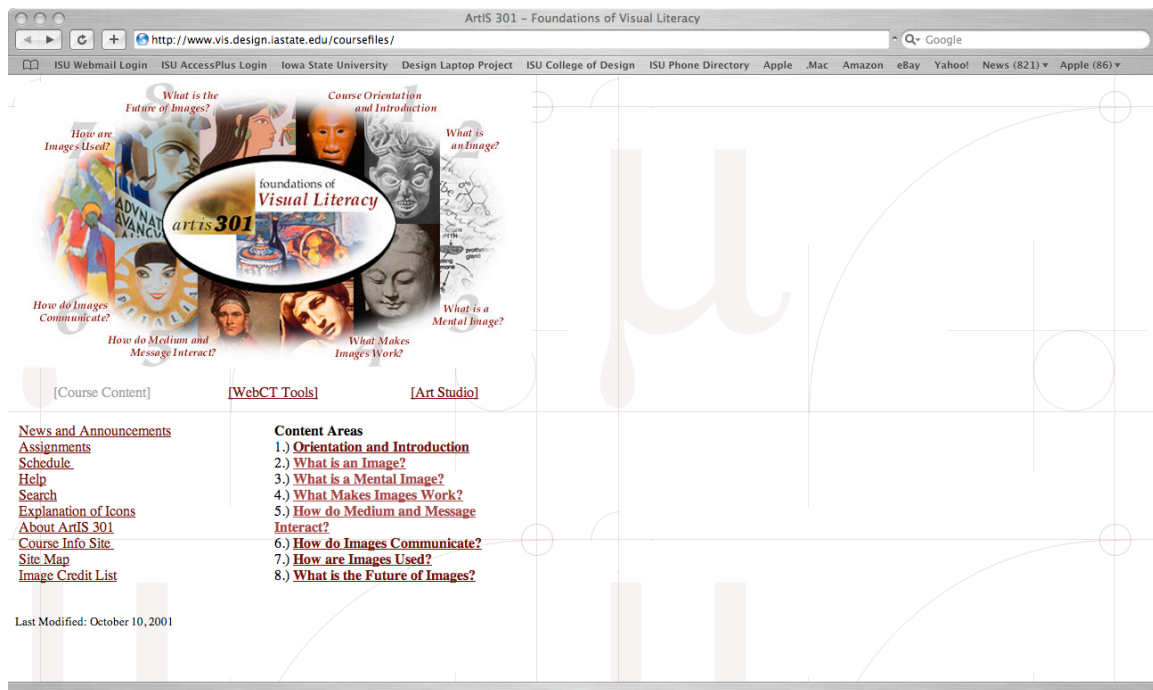
The following questions will pertain to the visual design of your online course, ~~Artis 301 Foundations of Visual Literacy~~. Answer the questions by giving a ranking on a 5 point Likert scale (1=Strongly Disagree, 5=Strongly Agree). Some questions will ask you to write in an answer.

1. Gender (Male or Female)
 2. Age (18-24, 25-34, 35-44, 45-54, 55-64, 65 and above)
 3. How many online courses have you taken (include courses you are taking now)?
 4. Are there certain color combinations that work well for you when viewing information on the ~~Artis 301~~ course site?
 5. The colors used in your online course enhanced the site, rather than distracted your attention away from the content on the page. (1=Strongly Disagree, 5=Strongly Agree) 1 2 3 4 5 NA
 6. The images on your course site were relevant to the content. (1=Strongly Disagree, 5=Strongly Agree) 1 2 3 4 5 NA
 7. Give an example of a time when an image did not relate to the content on your course website.
 8. Does your online course site's navigation use text, icon, text and icon or something else?
 9. Do you prefer your online course's navigation to use text, icon, text and icon, or something else?
-

ISU IRB # 1	06-611
EXEMPT DATE:	8 March 2007
Initial By:	jlc

10. Is your online course site's navigation organized into lists, navigational bars, menus, and/or something else?
 11. Do you prefer your online course's navigation organized into lists, navigational bars, menus and/or something else?
 12. The size of the text in your online course site is easy to read online. (1=Strongly Disagree, 5=Strongly Agree) 1 2 3 4 5 NA
 13. How was the body text broken up on the page (e.g. 1 column, 2 columns, etc.) in your online course website?
 14. Was the length of the lines of type comfortable for reading in your online course? (1=Strongly Disagree, 5=Strongly Agree) 1 2 3 4 5 NA
 15. Information on a page can be highlighted through the use of visual cues (e.g. color, size, etc...) Did the course designer bring attention to the important information on the site? Explain.
 16. What would you do (if anything) to improve the design of your online course?
-

APPENDIX B. ARTIS 301 COURSE WEBSITE




Envisioning Information

http://www.vis.design.iastate.edu/coursefiles/IIIC.html

ISU Webmail Login ISU AccessPlus Login Iowa State University Design Laptop Project ISU College of Design ISU Phone Directory Apple .Mac Amazon eBay Yahoo! News (821) Apple (86)

What is a Mental Image?



Envisioning Information

We live in a three dimensional world and have continual personal experiences with the fourth dimension of time. How are we to communicate the information we experience, about our complex living experiences? Words and numbers are the common, preferred vehicles for precise communication.

If we are to, however, communicate visually we must first create a mental image in the mind's eye, which can then be rendered in the world of materials. This requires us to escape from flatland, the two dimensional plane of the piece of paper, canvas, video screen, or other 2-Dimensional surface.

Escaping this flatland is the essential task of envisioning information - for all the interesting worlds (physical, biological, imaginary, human) that we seek to understand are inevitably and happily multivariate in nature. Not flatlands." Edward R. Tufte, [Envisioning Information](#)

Envisioning information requires you to make decisions concerning:

- [Levels of Abstraction](#)
- [Mnemonics](#)
- [Bizarre Imagery](#)
- [Novelty that Aids Memory](#)

[\[Home\]](#) [\[Mental Image\]](#) [\[Envisioning Information\]](#) [\[Self-Reviews and Quizzes\]](#) [\[Search\]](#)

Using this Site










http://www.vis.design.iastate.edu/coursefiles/usingthissite.html

ISU Webmail Login ISU AccessPlus Login Iowa State University Design Laptop Project ISU College of Design ISU Phone Directory Apple .Mac Amazon eBay Yahoo! News (821) Apple (86)

Art IS 301 Explanation of Icons

Icons Used

These may pop up from time to time.

Icon	Description
	Learning Objective: This is a learning objective for the course. If you do not understand what it asks you to learn, contact your instructor by e-mail.
	Directed at the Student: The individual student should pay careful attention to this class material. Individual understanding and action are expected in this section.
	Take Note: Student will need to know this item for a quiz or in order to complete and assignment. Write this in your notebook, or use the Note function provided by WebCT.
	Understand/Think: This is a cognitive, knowledge based area. Student must thoroughly understand the information in this area.
	Main Idea: This is a main idea or concept in this course. It is important for the student to base his/her thinking around this idea.
	Key Point: This is an important point that illustrates the main concept in this section. It provides a more detailed example of the main idea.
	See: Student must understand and view the visual idea(s) presented here.
	Question: What do you as a student think of this idea? This requires each student to dialog with other students or the instructor via the on-line discussion forums or by e-mail.
	Refer to Text: Student should refer to the printed course text or PDF file for more in-depth information on this subject.

BIBLIOGRAPHY

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Board of Regents. 2002-2003, 2003-2004, 2005. Annual report on distance education.

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ACKNOWLEDGEMENTS

I would first like to extend my gratitude to my major professor, Sung Kang, who always had her door open when I needed to talk to her. The advice she has given me throughout this entire process has been crucial to completing this thesis. Thank you Sung for everything you have done to make this possible.

Also, I would also like to extend a special thank you to my committee members, Paul Bruski and Connie Hargrave. I appreciate the ideas and input both of you have given me.

I have had the greatest support system to see me through my graduate school experience. My family, my friends, and my boyfriend, Kris, helped me through some difficult times. I thank you all.

Lastly I would like to dedicate this thesis to my grandmother, Sharlyene Baird, who cannot be here today to see this part of my journey come to an end. Providing support and encouragement, she was involved in my education from kindergarten to graduate school. Grandma always had a genuine interest in what I was doing and always believed in me. She was a woman with class, courage, and a loving heart.